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TRANSACTIONS

OF THE

Mississippi Valley Medical Association.

TWENTY-EIGHTH ANNUAL SESSION

HELD AT

KANSAS CITY, MO.

OCTOBER 15, 16 AND 17, 1902.

VOLUME IV.

PRINTED FOR THE ASSOCIATION.

1903.

BOSTON MEDICAL
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KANSAS CITY, MO.:
BURD & FLETCHER PRINTING CO.
1903.

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PRESIDENT'S ADDRESS.

THE RELATIONSHIP LUES BEARS TO THE BODY POLITIC.

BY S. P. COLLINGS, M. D.,
HOT SPRINGS, ARK.

The honor conferred upon me by this Association at its last annual session, is, I assure you, most heartily appreciated; but when I look over the list of names of my illustrious predecessors my heart sinks within me, for in that list I find names familiar to every section of our country, and names which are intimately associated with the advancement and upbuilding of every branch of medical science in America.

The question whether I can fill acceptably the chair held by such men has not been left for me to decide. You have seen fit to elect me to preside over your annual session; I thank you sincerely and I shall bring what talents I possess to the fulfillment of this office.

In the selection of a subject to talk to you about today, I shall digress somewhat from the usual custom followed in an opening address, in that I shall not deal with any recent advance in medicine or surgery, but shall talk to you about a disease which is as old as man and is a subject that from time to time has been ventilated by men, both medical and lay, probably ever since the formation of the world.

I have deemed it best to select the subject, "The Relationship Lues Bears to the Body Politic" for my address for several reasons. First, because of the importance of calling attention constantly to a disease so widespread as this one is; secondly, because it is a disease, which, when people are properly educated concerning its frequent occurrence, together with its various modes of transmission from one person to another,

can be controlled more effectively than most diseases of a contagious nature, and lastly, because for the the past twenty-five years I have daily been an observer of its frightful ravages upon the body politic, or society at large, and consequently feel that I am better fitted to address you upon this idea than almost any other one that I could select.

I know that I may possibly be criticised for calling your attention to a subject of this nature, and that opposition will develop to any plan I might suggest for controlling the spread of this disease, but great reforms are only accomplished, if ever, in the face of both criticism and opposition.

We will first take up briefly the history of this disease, and I would especially call your attention to the evidence of its great antiquity. Its history is so closely interwoven with the history of the world that it is difficult to dissociate the one from the other. It is one of the most ancient, if not the most ancient, of all diseases. Human nature is the same now that it was in the time of Adam and Eve; human impulses, desires and appetities remain now exactly as they were then, so why should not a disease, which according to the best medical testimony of today, has for its principal causation the promiscuous gratification of man's lust, have existed in the earlier days of mankind?

Anyone who will investigate history, both profane and religious, impartially, cannot fail to be impressed with the fact that there existed among all peoples of antiquity, from the earliest records kept by the Chinese and the Hindoos down to the records of the Hebrews, the Greeks and the Romans, a disease characterized by a primary sore at some spot upon the body, which was followed by constitutional symptoms, these latter symtpoms first manifesting themselves upon the skin and mucous membranes, and later in the joints, the bones and the viscera.

Nor are the book accounts the only proofs existing which show that syphilis was a disease among the people of antiquity. Anthropology has demonstrated that an affection was present among men in prehistoric times which produced lesions of the bones and of the teeth, corresponding precisely

with the lesions of these parts found today in teritary syphilis and in the inherited forms of this disease. Records show us that in China, 2,637 years before Christ, or 4,526 years ago, that the Chinese knew of the dualty of the chancre, and also knew that gonorrhea and syphilis had nothing in common with each other. They not only knew these facts, but they were also aware of the fact that the medicine antagonistic to the specific poison was mercury.

From Egypt, that vast storehouse of hidden treasures relating to past history, two authenticated documents have come to us which throw some light upon the disease that existed among the Egyptians at the time of the Pharaohs. One of these documents, the *Medical Papyrus* of the Berlin Museum, was examined some years since by Chabas, but it does not give much information upon the subject we are dealing with. The other document known as the *Ebers Papyrus,* which is thought to date from the time of Rameses II, about 3,000 years ago, and is the most ancient complete book in existence, describes a disease which affected the various parts of the body, was sometimes found involving the abdomen, the extremities, the eyes, the gums, the joints and also at time the mouth and other localities where the skin and the mucous membrane come together.

Syphilis certainly existed among the Jews centuries before the birth of Christ, for in both profane and Biblical history of this remarkable people we find repeated references to a disease running the same course as lues today runs with us. In Leviticus we find Moses, who, by the way, was one of the greatest sanitarians the world has ever produced, forbidding certain vices; bestiality, incest, abnormal sexual intercourse, and even legal prostitution. The result of the enforcement of these rules and regulations was that those Jews who were sexual perverts began the worship of Baal Peor, a God of the Moabites, a people who lived adjoining them. This worship of Baal Peor, from what we can learn of it from authenticated documents, was nothing other than a sexual orgie in which the participants gratified every variety of sexual lust. Of course, the natural result of these practices was a fright-

ful venereal disease, which, when introduced into the Hebrew camp, was intensely contagious and spread like wild-fire. The disease assumed such proportions that eventually Moses had 24,000 men, who had contracted it, summarily put to death.

Among the ancient books of the Hindoos, a contagious venereal disease was mentioned as far back as 1,000 years before Christ. The Hindoo description of this disease brings lues right before our eyes. No one can read their accounts without knowing that syphilis is the disease meant. They, of course, did not know it by that name, or in fact any of the names we apply to it, but their description of its symptoms are so accurate, that any one familiar with the symptomsof lues cannot for a moment doubt that syphilis is the disease referred to. They, in their descriptions, even referred to plantar and palmar syphilides, to exostoses and to gummata.

Concerning syphilis among the Greeks and Romans, I am not going to say anything other than that it existed, and is frequently referred to in literature of these peoples. Any one desiring to investigate the subject can do so for himself. If the Grecian and the Roman literatures contained no reference to this disease, but only set forth the moral and religious conditions existing among these nations, their utter loss of all decency in matters pertaining to sexual and religious affairs would almost force us to admit that this disease existed among such depraved people. What depravity or licentiousness could there be that would not flourish under a Nero?

All during the Middle Ages we find repeated reference in the literature of the various nations to a venereal affection with symptoms such as we find existing in lues today, but in 1494, augmented by centuries of every variety of debauchery that human ingenuity could invent, we find it assuming an epidemic form and spreading more rapidly than it formerly had until all Europe knew and felt its ravages.

Concerning the epidemic of the fifteenth century a good deal has been written. The rapid dissemination of the disease throughout Europe at this time had generally been attributed

to the return of the French soldiers from the siege of Naples, which took place in 1494, and in which place for some years previous to the siege, an unusually severe form of the disease had existed. In dealing with this epidemic medical writings are very confused and reflect in a general way the almost universal state of charlatanism and superstition that pervaded not only medical writings, but the writings of every other character of that day. One fact, however, forces itself upon our minds, and this is, that about the time of this epidemic the disease under discussion assumed a malignant form, and although characterized by the same general manifestation, these became more pronounced and more malignant.

So much for a brief synopsis of the history of lues as it existed among the ancient races, and those of the Middle Ages. What do we learn from it? We learn that just in proportion as a people have given themselves over to immorality, or as they have regulated their lives on a decent scale, they have suffered from venereal disease, or they have been comparatively immune from such diseases.

The question then which arises is, How can the spread of this disease be controlled or prevented?

My opinion is, that if the public were educated more thoroughly concerning it, as it has been and is being educated concerning the communicability and modes of transmission of tuberculosis, half the battle will have been fought. But just so long as we draw the cloak of secrecy about ourselves with an air of profound dignity, when we should instead give a few words of wisdom; and just as long as a public assume the part of being injured, if not insulted outright, at the mere mention of the name, there will be just that many more innocent victims added to the already appallingly long list. The public must first be willing to learn before it can be taught.

In regard to the acquirement of syphilis, people should be taught that it cannot be communicated only by some infected person, or by some article which has come into contact with the specific poison. For instance, kissing is one of the prolific modes of transmitting this disease from one person to

another. Bulkley has shown that this disease can be conveyed, not only by means of knives, forks, cups, glasses and jugs, but that it has even been conveyed by tobacco, pipes, cigars, cigarettes, troches, chewing gum and candy passed from one person to another, and also by shirts, plasters, towels, sponges, toothbrushes, syringes and sick chairs. Nothing is more infectious nor more dangerous to those about it, than a new born babe with inherited syphilis. People should be taught that those who have this disease are for several years after infection a source of danger to those thrown into intimate contact with them, and that each infected person should have his own individual effects, and that these effects should be used by no other person than the one infected. Ignorance concerning the modes of transmission from person to person is partially responsible for its widespread distribution, and if we can dispel some of the ignorance, and overcome some of the false modesty with which discussion of this disease is hedged about, we will have made a good start towards preventing its further spread.

The medical profession occupies a peculiarly favorable point of vantage from which to attack this disease, for the family physician comes more intimately into contact with the people of a community and can talk with less reserve upon this subject than any other person.

In looking over the history of syphilis we find one other subject intimately associated with it, namely, prostitution. Every nation apparently has seen some connection between these two subjects, and each has grappled with what it considered the cause in its own way. The Romans and the Greeks believed in regulating the prostitution by legal methods. Of all the races of antiquity the Jews alone seem to have had the proper ideas regarding prostitution. They believed that to prevent the spread of contagious diseases of this character the prohibition of prostitution was absolutely essential. In our day and time, and under our laws and customs, the prohibition of prostitution is not practical. Regulation of this vice by means of sanitary laws and police laws has been tried from the time of the Greeks and the

Romans to the present day, and in every instance has proven ineffective in controlling the spread of contagious diseases of this character where these methods alone have been relied upon. Registration and regulation have been in vogue in Paris for the past hundred years, and while it may have succeeded in preventing, to a certain extent, some spread of syphilis, the vast number of women who clandestinely indulge in prostitution are not reached by its operations, and it also does not take cognizance of the fact that this disease is spread by men as well as by women. If we are to have legalized prostitution regulated upon sanitary principles, do let us be consistent and subject the men who frequent the legalized houses to the same rules and regulations in regard to examinations, that the poor unfortunate inmates of these houses are subjected to.

That this is a vital subject can readily be seen from the fact that when the Medical Society of the County of New York began to investigate the subject of the Prophylaxis of Venereal Diseases in New York, in 1901, it was found that as near as could be estimated, there existed in New York City alone, somewhere in the neighborhood of 200,000 cases of syphilis, and in the whole United States, Gihon, a few years ago, estimated that there were at that time 2,000,000 cases. The importance of this subject is also emphasized by the fact that an International Conference for the Prevention of Syphilis and Venereal Diseases was held last month at Brussels; this being the second International Congress held for the purpose of deliberating upon the method of prevention of venereal diseases, the first one having been held three years ago at the same place. At this meeting were gathered together some of the most eminent men and women from every civilized country in the world, and those who participated in the meeting as delegates were not confined to the medical profession alone. It is true, they were in the majority, but there were also present legislators, jurists, editors, delegates from benevolent societies and representatives of the police.

My object in presenting this subject to you, then, is to im-

press upon you that syphilis is most prolific of harm to humanity; that its dire results are far-reaching; that it is no respector of persons; it attacks all classes and makes itself felt as viciously in the palace as in the hovel; and that we, as physicians, going into families under all circumstances, and knowing all the skeletons that exist in the closets of the various families under our charge, can do more by educating our patients as to the various modes of infection of this disease, and by advising with the younger ones among those whom we treat, than by all the laws that ever have been, or ever will be placed upon our statute books, can do to prevent the spread of *Lues.*

ADDRESS IN MEDICINE.

HOW NOT TO BE NERVOUS.

BY HUGH T. PATRICK, M. D.,

CHICAGO, ILL.

Nervousness seems to be the stepchild of medical practice —somewhat disliked, half understood, certainly neglected. For the average practitioner no problem in the theory of organic disease is too profound for attempted solution, no law of life too exalted for his aspiration, no bacillus so small as to elude his pursuit, but with such a triviality as nervousness, its nature, prevention and cure, he seldom seriously occupies his mind. To acquire a working knowledge of the brain is too much bother. To ponder the plain facts of heredity, development and child-rearing is too uninteresting. To cultivate a familiarity with the various passions and emotions, to search out manners of thought and feeling, or even to discover the dominating element in the life of a patient is quite impractical. To take the time to counsel those about to marry or to instruct the mother how not to spoil her children; to caution the father about his erratic son and give detailed instruction how to make him stable; to talk seriously to the young woman who is "all nerves" and lives in her emotions; to reason clearly and forcibly with the head of a family who is preparing himself for a premature break down—these are minor matters pertaining—to whom? to what? God knows, the physician does not. And yet if you will stop for a moment, take your finger from the pulse and your hand from the scalpel, your eye from the microscope and your thoughts from the microbe, I think you will agree with me that these trivialties contribute quite as much to human suffering and disappointment as do the in-

fections, inflammations and neoplasms in the long category of human pathology. No apology, therefore, is made for the following remarks on that pest, nervousness. My regret is that an abler mind is not here to do the subject justice.

The initiative of all therapeutics should be prophylaxis; prevention is paramount to cure. The first and most effective preventive of nervousness is a reasonably long line of first-rate forbears. Like begets like, and the nervous system bows to the law of all life—the law of heredity; the law that goverdned your birth and mine and laid a heavy incubus on some of us; a burden of unstable nerves and abnormal susceptibilities; a burden that endures even unto the third and fourth generations.

To be able to present a specific illustration of the force of inheritance in the genesis of funcational nervous affections, I have tabulated from my office records one hundred consecutive cases, which might be included under the general term "nervousness," and I find that in 70 of them a neurotic heredity has been in evidence. Although a bad heredity is the most frequent and most potent factor in the production of nervousness knowledge of this fact is not to lead us into apathetic resignation, but rather make us face the difficulty with wise determination. The poor victim, instead of being allowed to dissipate the modicum of stamina a bitter fate has given him, is first to be shown just what his capital is, and then is to be taught just how to make the most of it.

Next to the omnipresent, inevitable laws of inheritance comes the never-ceasing formative power of environment. The impress of extraneous influences begins at birth and ceases only with the extinction of life, but childhood and youth are the plastic stages. Here, as elsewhere, the result equals the force divided by the resistance. "As the twig is bent the tree's inclined," and second only to the mystic law of birth, which decrees that the nervous system shall have this or that potentiality, is the force that guards or mars its early growth. Unfortunately, in too many instances the unstable and maybe irrational parents who gave to the child his poor nervous apparatus are the ones who guide, or mis-

guide, his early steps into the perdition of nervous wreckage. To look on such a child with the assurance that he is growing up to be the victim of nervous unbalance, inebriety, or insanity, should not be idly to feel the despair of conscious impotence, but should be co-existent with an effort to avert the disaster. Wherefore, I beg to say a few words that bear particularly on nervousness in the child and its avoidance, but with this understanding, that they apply almost equally to the adult, and that what is said later about grown people applies to children to the extent of their development.

For preventing nervousness in the child or removing that already present, nothing is so effective as the toughening of the body and mind. The frequency with which I hear from a nervous patient that "she was never strong," "he was a delicate child," "she was always sickly," etc., is truly startling. A child who is made to have hard muscles, strong lungs and a vigorous digestion; who can bear changes of temperature and endure pain is already a long way from nervousness. More important still is toughness of psychic fibre. The child who can support disappointment, who can be "crossed" without a tantrum, and who habitually obeys is building a bulwark against "nerves," and the one who is not easily frightened, has self-control and a budding courage, has nipped half a dozen neuroses in the bud. But to procure this toughness, be it understood, a certain exposure to bodily discomforts and mental hardship is necessary. This world is no "Happy Valley," and children brought up like Johnson's Rasselas are as little happy and as little able to cope with the realities of life as was that puerile prince. Many a father whose rugged rearing has given him a robust frame and a sturdy nervous system takes infinite pains and pleasure in denying his sons the very training that made a man of him. His unwise love strangles in infancy whatever of sterling qualities he may have transmitted to them.

Two capital errors in the training of children frequently come to my notice; errors that prepare the little unfortunate for later nervousness or fairly drive him into it. They are, first, leading the child into pleasures and duties beyond his

years; second, magnifying his importance in the family and society. It is quite as dangerous to give to children the pleasures of adults as to require of them the labors of the mature. That there is a physical basis for all intellectual processes seems sometimes to be forgotten. Successive groups of brain cells and fibers come into existence with the successive years, and before the birth of these tissues certain psychic functions may not naturally exist. To force mature functions from an immature organism is to violate the virginity of Nature—a crime daily committed in the home and in the school, to be expiated in the sick-room, sanitarium or asylum. In the beginning, the fault generally lies in a mixture of vanity and igonrance on the part of parents. They wish their children to excel in attainment and they like to see them indulge in all the pleasures and excitements of our complex social existence. Later, the young person whips himself on to ruin. To instance only one disaster: the annual casualties following graduation from hot-house schools and colleges easily outnumber those of the whole disastrous camp life and battles of our late Spanish war.

As regards the second error just mentioned, it has seemed to me that if deliberately planned and scrupulously executed, the bringing up of some children could not better promote what I venture to call centripetal development—development centering in self. The child is not only made to be, but is made to know that he is, the focus of all domestic doings, the hub of the family wheel. Every sensation, perception, conception and emotion is an event. The unlucky youngster develops with a distorted view of the relation of things. He sees enormously enlarged images of his tastes, his clothes, his pains, his likes, his aversions and his talents. These proportions do not fit the facts of existence and the unfortunate individual is as sure to be caught in some form of nervousness as is one to go astray in a labyrinth of grotesque mirrors.

I must note one more point on prophylaxis of the neuroses in children, a point already lightly touched, and then we shall leave the little people—much as I should like to linger. In one form or another fear enters into the makeup of nearly

every sort of nervousness. It paralyzes judgment, ambition and the higher emotions. Childhood should be absolutely fearless; fearless for self and for the future. That the young should have no fear of man or God, no thought for the morrow is natural and proper. It is natural and wholesome that the child should have no regard for his organs, no knowledge of hygienic rules, no conception of the significance of pain. When the parent makes the child a party to his apprehensions, confides his prescience of ills and communicates the ominous augury of bodily symptoms, he is assiduously rearing a little hypochondriac who will live to condemn the parent who made him a burden to himself and a curse to others. Fear of the dark, of thunder and lightning, of animals, burglars, accidents, spirits, devils and death is born of parental foolishness, and is always potentially the seed of later nervousness. Quite recently a physician, who for many years has had at intervals typical and intense agoraphobia with fear of sudden death, told me with the utmost naivete that when a child he never could sleep alone. It seems never to have occurred to him that if he could not sleep alone it was because he was allowed to have such a fear, or, quite as likely, because the parents carelessly or deliberately planted fear in his infant mind.

After birth and bringing up, after the facts of heredity, childhood and youth, comes adult life—the life of man and woman. But they are as children still, mutable, mobile, imperfect always, swayed by a thousand influences, slaves to countless circumstances. How shall they manage not to be nervous? By proper living; proper working and playing, eating, drinking and sleeping; above all, proper thinking and feeling.

Labor may have been a calamity to Adam and Eve. Nowadays it is no curse, but the bright particular star of health and happiness. To have a wholesome ambition and to work with enthusiasm for its fulfilment, these form the very essence of a vigorous existence. Fortunately, man is now so constituted that to work, and work with an object, is a function necessary for his completeness. To cross this dictum of

Nature is to suffer—physically, mentally or morally, in many instances nervously. Many an invalid would be well today if he had a worthy purpose in life and happily labored for it. Many a histerical woman would be stable and strong had she consistently striven with singleness of aim for a laudable object. The purposeless idler is ever a weakling in unstable equilibrium, upset by every vagrant mood.

To say that overwork is not a very frequent cause of nervousness is frankly to enter the ranks of heterodoxy, but my experience is that work, hard work, is wholesome. To work hard is to get tired; to work too hard is to get too tired; but I seldom see the familiar spectacle of nervous breakdown due to work alone. It is the unwisdom that goes with the work. It is worry, the strain of doubt, the wear of ungratified ambition, the depression of failure or the passionate play of other emotions that makes the nervous wreck.

Though man's nature demands work for his development and equipoise, it none the less needs play. Long before the birth of physiology it was known that the greatest efficiency of any living tissues was attained by alternating activity and rest. The cycle of the seasons, the night following the day, the succession of blossom, fruitage and quiescence, the universality of holidays, are so familiar as to cause no thought, but all life is attuned to this wonderful rhythm of action and repose. Even the busy heart that never ceases throbbing day or night from birth to death, so beats that every contraction is followed by a period of rest almost twice as long; that is, a healthy heart works only about one-third of the time. What is a good law for the heart is not a bad rule for the brain, but for this complex creature called man, something more than mere rest is necessary. Besides relaxtion we must have diversion, amusement, fun, if you please. We must play if our work is to be effective and long sustained and if we are not to be nervous.

The advisability of reasonable eating, the pernicious effects of alcohol on the nervous system and the havoc wrought by drug habits are so universally recogonized as to need no

mention. With respect to diet, however, I cannot refrain from noting one bad habit that has seemed to me to be very frequent in nervous people and to contribute materially to their troubles. I mean the starvation habit—the obsession, born of poor doctors or officious friends, that makes the victim eschew one article of food after another until he is trying to exist on Fakem's nularine and Buncombe's cereal.

Of all nervous sedatives and tranquilizers of mankind, none equals "tired Nature's sweet restorer, balmy sleep." Sancho Panza truly said, "It is meat for the hungry, drink for the thirsty," and, as a matter of fact, we know that one can live without sleep just about as long as he can live without food. Children should be encouraged to sleep, young people should be made to sleep and the nervous person should be taught to sleep. The sins of parents who carelessly or designedly shorten the children's sleep hours is only equaled by the folly of grown-ups who deny themselves sleep for the sake of business or pleasure. Alarm clocks are an abomination unto the brain and an evidence of hygienic evil.

A deal of nervousness is caused or helped along by misdirecting energy, misplaced worry, longing for baubles, the fighting of phantoms. To recognize the really important things in life is one of the most difficult tasks of judgment that come to the individual. Having settled on the essentials, it is perhaps equally difficult to ignore all else. This is certain; the man or woman who can early reach a wise decision in the matter and then steadily follow the tenor of this decision could not be nervous, even with the aid of ancestors and the connivance of parents. Fretting over non-essentials, striving for objects not worth the having, fright at empty forms, looking inward at little self instead of outward at the greatness of creation—these are the follies that keep us nervous. And closely allied to them is the nervousness of indecision—the demon of reconsideration. How many thousands of people have worn themselves to nervous shreds by turning over and over the same problem, reaching again and again the same conclusion? It is well worth while to

acquire a habit of prompt and definite decision. To allow one's self to reopen settled questions begets a habit of doubting one's own ability or even reliability, which is pernicious in the extreme.

If to define for one's self the really great and valuable is important, equally so is the determination of one's own place and one's own value. Realization of the fact that the individual is merely a minute item in a limitless cosmos, at most a not very important integer in a complex society, should be the first step toward a rational adjustment of values on which must rest that serene placidity which is the antithesis of nervousness. To be plainer still, the person who is brought up, or brings himself up, to feel that he is of paramount importance; that his feelings, wishes and opinions are always entitled to prompt consideration, is on the very highway to nervousness. He is doomed to much disappointment; many rude shocks to his sensibilities breed a gnawing bitterness of spirit; he naturally gravitates into the neuropathic vice of introspection. To develop the conception that he is peculiarly constituted; that he is a wonderfully unique organization of finer mechanism than his fellow-mortals, is continuously calamitous for anyone. As a matter of fact, one man's stomachache is much like another man's colic, one woman's aversions about as strong as another woman's antipathies, A's grief as keen as B's sorrow. The perfectly normal individual carries as part of his innermost consciousness the knowlelge that pains, tears and troubles come to all, and that what has been borne by man for countless ages can be endured again. Such knowledge, too, must in part form the natural base of true altruism and effective ethics. That lofty ethics should constitute a goodly plate in the armor against nervousness is seldom mentioned, but practical experience has time and again taught me that sincere love of truth, justice and self-control is a mighty help in the fight against nervous instability. Of particular value are a clear appreciation and uniform practice of the exact truth. They are the best protection against that variety of nervous trouble which has for its

essential feature repeated exaggeration and self-deception, if not deception of others.

Sooner or later, consciously or unconscously, every ambitious person must make a more or less deliberate estimate of his ability. Blest be he who does it early and accurately. Ambition is a wonderful force and makes for progress; emulation is an excellent stimulus, and industry is better than both, but in excess the combination has worked the nervous ruin of many. The young man of high aims who wishes to rival the success of a Lincoln, an Astor, or a Virchow, and who thinks that the only necessary conditions are industry, honesty and frugality, makes an egregious error. He reckons in ignorance of two stupendous factors, physical endurance and mental capacity. These are facts as indubitable and as inevitable as death itself. It must come to every physician, it certainly comes frequently to me, to explain to the nervous student that because his colleague can keep well on five hours of sleep is no reason why he should be able to do the same; to show the irritable, sleepless business man that even if his competitor can work fifteen years without a vacation, he cannot do likewise; to convince the ambitious Mrs. X. that she simply is not equal to the attainment at the same time of domestic excellence, social eminence and philanthropic distinction as is the brilliant Mrs. Y.; and to tell the disappointing truth to many that although some fortunate beings are given master minds in master bodies, this gift is not for all, and that to spur on the weary faculties is to drive to ruin. Still, if one must plainly see that his talents are far below the maximum, even far below what he had hoped and believed, why should he dissipate what he has in attempting to be what he is not, and in fretting because he can not? How many of us exhaust ourselves and wear out our friends by chafing against the chains of the unalterable! Imperturbability is a prince of peace.

Of especial danger is the weakness of being ruled by the feelings; by emotion rather than by reason; by impulse rather than by judgment. In the bitterness of recognized folly

and acknowledged frailty, Burns wrote for his own epitaph:

* * * * *

"Is there a man whose judgment clear,
Can others teach the course to steer,
Yet runs himself life's mad career
Wild as the wave;
Here pause—and, through the starting tear,
Survey this grave.

"The poor inhabitant below,
Was quick to learn and wise to know,
And keenly felt the friendly glow,
And softer flame;
But thoughtless follies laid him low,
And stained his name!

"Reader, attend,—whether thy soul
Soars fancy's flights beyond the pole,
Or darkling grubs this earthly hole,
In low pursuit;
Know prudent, cautious self-control
Is wisdom's root."

If this was written with the plaintive note of a sensitive spirit prisoner to turbulent passions, it was also written in the light of a keen perception. A principle of human development is bound up in the lines. The head is to guide the heart. Impulse and emotions are to be governed by knowledge and wisdom.

Inhibition should never sleep. Exaggeration of the instinct of fear and apprehension not only makes people nervous, but is nervousness itself. The thousand and one needless worries over the future are simply providence for the morrow gone mad. Fear of disease and death is normal, but to allow the mind to dwell on these fearsome things is to become a hypochondriac with no more stability than the leaf on the aspen. To shrink from pain is as natural as hunger and as necessary for the preservation of the race, but to be a slave to suffering is to be a nervous wreck. Pain should be a signal officer only—to inform, never to command. Even the godly emotion of parental love must not

be too exuberant. How many mothers become mere bundles of nerves through needless fussing about the children, and how often a father falls into presenility from the constant strain to feather the nest superlatively well. To weep is normal, but the one who never restrains the impulse to cry ultimately becomes flabbily lachrymose, a nuisance to self and others. Every human being has, now and then, a "fit of the blues," but he who allows himself to be regularly dominated by mental depression becomes an enervated personification of gloom, a victim of the most distressing form of nervousness.

To sum it all up, if you wish never to be nervous, live with reason, have a purpose in life and work for it, play joyously, strive not for the unattainable, never regret the unalterable, be not annoyed by trifles, aim to attain neither great knowledge nor great riches, but unlimited common sense, be not self-centered, but love the good and thy neighbor as thyself.

ADDRESS IN SURGERY.

OPERATIONS FOR CANCER OF THE MOUTH AND NECK.

BY G. W. CRILE, M. D.,

CLEVELAND, O.

Preliminary Remarks.—Of the numerous operations known to the surgical art none have ever been held in higher estimation nor have had more apprehensive considerations than the surgical interventions upon the neck. By the earlier physicians all surgical precedures of this region were almost invariably regarded as preeminently fatal, and as such, largely, if not totally, condemned.

Dieffenbach in 1848 stated in his "Operative Surgery" that he regarded the extirpation of a goiter as an adventurous undertaking which should rather be desisted from than advised. From 1850 to 1883, during which 400 operations for goitre were performed, the rate of mortality was reduced 15 per cent. In the antiseptic period which followed this, Beverdin collected 6,000 cases, showing a mortality rate of 2.8 per cent. In other operations upon the neck, an equal or even similar improvement cannot be recorded, yet an advance is clearly indicated. The least satisfactory are operations for carcinoma. In operations for carcinoma of the parts most frequently affected, a variable number of statistics have been published from which the results of successive periods are obtainable.

Statistical Study.—In the operations for carcinoma of the lips, the statistics appearing prior to 1885, including those of Thiersh, Billroth, Bergmann, Winniwarter, Kotch and Partsh, are as follows:

Total, 535; operative deaths, 44 out of 535 cases, or 8

per cent.; recurrences, 128 cases out of 434, or 37 per cent.; three year cures, 108 out of 389 cases, or 27 per cent.

A fair comparison of the results prior to 1885 may be found in the report of the clinic of Von Bruns. From this clinic Wornerrin, 1886, published a report of 277 cases of carcinoma of the lip operated up to that time. In this statistics are to be found as follows:

Operative deaths, 16 out of 277 cases, or 5.7 per cent.; recurrences, 101 out of 277 cases, or 36 per cent.; three year cures, 106 out of 277 cases, or 37.7 per cent.

Loos in 1898 supplemented this report of Wormer by 260 additional cases collected in the same clinic since the year 1886. In this the statistics given are:

Operative deaths, 1 out of 141 cases, or 6 per cent.; recurrences, 27 out of 141 cases, or 30 per cent.; three year cures, 93 out of 141 cases, or 65 per cent.

Taking the tables of Van Bruss for the comparison between the results obtained, prior to and subesquent to 1896, it is seen that the operative death rate decreased 5 per cent., and the recurrence 6 per cent., while in the number of three year cures increased over 27 per cent. In the years prior to 1886 the extirpation of the submental and submaxillary glands was practices only when enlarged and hard. Since it has been much more frequently, though not constantly practiced, and since 1895 the resection of the submental and submaxillary glands through an incision extending between the mandibular angles has been employed as a routine procedure.

Tongue.—The statistical compilations of the operative treatment of the tongue appearing prior to 1885:

WINNIWART.	OPERATIVE.	DEATHS.	CURES.		
Winniwarter.	46 cases,	19%	4 out of 46	8.6%	(1878)
Steiner.	26 cases,	15%	1 out of 16	6 %	
Woeffler.	82 cases,				
Budinger.			10 out of 64	15 %	(1881)
Butlin.	70 cases,		6 out of 70	8.5%	(1882)

Since then have appeared the statistics of

Whitehead.	39 cases.	4.3%			
Sachs. Kocher	57 cases,	10.5%	3 out of 57	34.3%	(1893)
Binder Kroenlein.	35 cases.	20 %	8 out of 3333	24 %	(1896)
Butlin	102 cases,	9.7%	35 out of 95	35.8%	(1898)
	233	11 %		32 %	

While in these statistics a sharp delineation as to the period of operation is not to be drawn, as many of the operations reported since 1885 were in reality performed prior to this time the difference in the results is striking. The rate of the operative mortality in both periods is approximately the same, the number of three year cures since 1882, however, is found to have been increased four fold. The reason for the similarity in the percentage of mortality rates in these two periods, with a simultaneous increase in definite cures, is to be attributed to the more radical operation which has been more frequently practiced since 1885.

Tonsil.—From the statistics of Newman Housell, Watson, Cheyne and his son, Butlin was able to analyze 73 operative cases for carcinoma and sarcoma. Of these, 14 or 20 per cent. died of the effects of the operation. In 54 cases the further history showed the following:

Alive or dead with recurrence	20
Died of cancer elsewhere	3
Well from 1 to 3 years	8
Well more than 3 years	9 or 17 per cent.

Cancer of other parts, such as the floor of the mouth, the mucous membrane covering the jaw, etc., have not been reported in sufficient series for seperate study. The cases reported show operative results very similar to cancer of the tongue, tonsil and lip.

Cancer of the Upper Jaw.—The report of the clinic of Prof. Koenig is the best large material available for study. In this clinic there have been 57 operations, with 19 or 33 per cent. of operative deaths and 9 to 15 per cent. cures. All cases have been followed and the report is complete. There was neither affection of the lymphatic glands, nor removal of them in any of the successful cases.

Recurrences occurred in situ. Acting upon this, the operations were most extensive. In two of the successful cases the eye balls were removed. In one the skin of the face was involved and ulcerated. In several there was widespread ulceration of the mouth. But one reoperated case was cured. Prof. Koenig strongly recommends removal of the entire

bone in all cases, even the orbital plate. The whole hope of the operation seems to rest upon a complete removal of the primary growth.

Thyroid Gland.—The statistical tabulations for the operative treatment of malignant diseases of the thyroid gland which, as given by most authors, include both carcinoma and sarcoma, both being stated to be equally malignant are:

	OPERATIVE DEATHS.	RECURRENCE.	CURES.
Braun. (1882)	22 out of 34 (64.7%)	6 out of 8	2. (11 & 6) months.
Kroenlin. (1893)	5 out of 11 (45 5%)		
Czerny's Clinics	out of 33. (15%) Ref. not obtainable.		5. (3) year cures.
Kochner. (1898)	6 out of 18. (33⅓%)		

Butlin in 1900 published comparative statistical tabulations of operations and their results which had been performed for malignant disease of the thyroid, both prior to and subsequent to 1884. In these statistics the

	EARLY SERIES.	LATER SERIES.
Died of operation.	30 (62%)	11 (35%)
Recurrence.	10	11
Three-year cures.	1 (2%)	1 (4%)
Unheard of and below three-year limit	48	31

high rate of mortality and the low percentage in three year cures find their ready explanation in the high degree of malignancy in carcinoma and sarcoma of the thyroid gland. To the high malignancy of these tumors is also to be added the fact that these neoplasms most frequently supervene an existing goiter, so that, in many instances, the existance of the carcinomatous or sarcomatous affections escape detection until after infiltration of the surrounding structures has occurred. This infiltration of the adjacent tissues occurs by direct contiguity. Commonly the carotid artery, internal jugular vein and vagus nerve are either singly or conjointly involved. Posteriorly the trachea and esophagus are also very frequently infiltrated.

The removal of the growth usually requires resection of one or more of the following structures: Jugular vein, carotid artery, vagus nerve, trachea and esophagus.

Branchiogenic Carcinoma.—Of the various affections of the neck bone, none are seemingly less amenable to surgical treatment than the branchiogenic carcinoma, first described by Volkmann in 1882. In a collection of 48 cases by Veau, of which 31 were operated, the results are:

Number of cases reported.....31
Deaths from the operation.....5, or 16 per cent.
Recurrence and death within 1 year.....10, or 33 per cent.
Cases under 3 years and unheard from...16, or 950 per cent.

These operations are technically most difficult and the growth is characterized by high malignancy.

In numerous instances intervention was no longer possible when the patients first presented themselves for treatment. These tumors early involve the great vessels and nerves. The adherence of the carotid artery and its ulceration is a less usual occurrence, but in three instances ulceration into the lumen of the carotid causing instant death is reported. Glandula metastases, however, does not usually occur. According to Veau it was observed but nine times in 48 cases.

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATIONS.

The Lymphatics.—Carcinoma is to be considered not alone a local disease but also an affection of the lymphatic system of the area involved. In former years only the glandular involvement of the lymphatic system was considered. Later microscopical studies showed that the lymphatic vessels, proceeding from the affected area to a lymphatic gland, as well as the vessels leading from such a cancerous gland, may also contain carcinoma cells. A mere anuncleation of the gland can therefore no longer be regarded as an effective surgical procedure. To insure a complete extirpation of the carcinomatous affection it is necessary to remove not only the affected area, and its lymphatic glands, but also the intervening area of tissues. The entire anatomical zone in which the lymphatic vessels course, and in which the glands lie, must be removed, en masse.

The lymphatic system in the neck is largely in relation to its vessels, the carotid artery and internal jugular vein. The superficial glands are but rarely the seat of metastasis. The

deep cervical glands, on the other hand, are very frequently involved. All resections of the lymphatics should be based on a radical technique. In the submaxillary triangle the submaxillary salivary gland is to be removed, as lymphatic nodes lie within its substance and lymphatic vessels are closely and intimately related to it; in the removal of the deep cervical nodes, an anatomical dissection of the carotid arteries, internal jugular vein and vagus is frequently necessary, as many lymphatic vessels are directly superficial to it, or are found within its fibres. The sheath itself should be removed, especially that portion of the sheath in relation to the internal jugular vein. All the connective tissue and fat around these structures should be resected. After a radical dissection, the arteries, veins and nerves are entirely separated and lie directly on the muscular bed without the intervention of any fascia. By these means alone is it possible to extripate the lymphatic vessels. Such a radical resection of the lymphatic system of the neck is known from clinical and experimental verifications to be unattended with any deleterious consequences. In the extirpation of the inguinal axillary nodes it has been noted that a pseudo elephantiasis in the leg or arm may at times occur. In the neck, however, no such efforts have been observed.

Sterno-mastoid.—The thorough exposure of the deep cervical glands requires the division of the sterno-mastoid muscle. Neither division nor partial removal are followed by any subsequent deformities, such as torticollis. The synergistic action of the trapezius, splenius capitis, and other muscles fully compensate for the loss of the functional action of the muscle. After division of the sterno-mastoid muscle, the two ends readily unite, while in the partial resection, fibrous tissue formation occurs in the interval. In the latter case there may be a depression on the superficial surface of the neck.

Spinal Accessory Nerve.—The fear of a resulting post-operative torticollis which has been expressed as occurring from the division of the spinal accessory nerve, before its entrance into the muscle, has also not been clinically substantiated. Milton, in a collection of 50 such cases in which the

nerve was severed at this point, during the resection of tubercular cervical lymph nodes, carefully looked for resulting symptoms, but found none. The double nerve supply of this muscle, both the spinal accessory and a branch of the second cervical nerve innervating it, is the preventive factor against paralysis when either nerve is singly injured. In those instances in which the spinal accessory nerve is divided the total innervation is assumed by the second cervical nerve. In the absence of this the compensatory action of the synergistic muscles, already mentioned, would be sufficient. The ease with which this nerve may be severed is recalled by most surgeons. The nerve, at the point at which it enters the sterno-mastoid muscle, is almost completely surrounded by lymph nodes, which, when enlarged, are said to easily cause its compression against the transverse process of the atlas. This compression of the nerve, when of sufficient duration, may be productive of a physiologic severance, so that the compensatory action of the second cervical nerve and the synergists to the sterno-mastoid is already assumed when the anatomical division occurs.

Large Vessels.—The jugular vein is the more frequently involved. The wall of the vein may, in most instances, be said to be almost simultaneously involved. The artery, which on the other gland is mobile within its fascial tube, is not necessarily involved when the carotid sheath has been invaded by the malignant process. As a rule it remains singularly free from carcinamatous infiltrations. The vein also partially overlaps the artery, anteriorly, and is more intimately related with lymph glands and vessels, offering a greater area for direct invasion.

The resection of the internal jugular vein should be unhesitatingly performed in every case in which there is even a doubt as to its involvement. In earlier years the ligation of this vessel was hypothetically assumed to cause grave disturbances, such as gangrene of one-half of the brain, face and neck. This view was shown later to be wholly wrong and since it has been clearly demonstrated that no untoward symptoms follow this procedure.

The Common Carotid.—Much more important is the ligation or partial resection of the common carotid artery. The importance of this vessel in the economy of the brain has also been greatly overestimated. Closure of this vessel was at one time thought to be almost invariably fatal. In the numerous statistics which have appeared on the subject of carotid ligation, these opinions were seemingly verified.

Valpeau	reports	137	cases	of which	30	per	cent.	died.
Norris	reports		cases	of which	50	per	cent.	died.
Pilz	reports	600	cases	of which	38	per	cent.	died.
LeFort	reports	370	cases	of which	47	per	cent.	died.
Wyeth	reports	789	cases	of which	41	per	cent.	died.
Friedlander	reports	218	cases	of which	13	per	cent.	died.
Reis	reports	73	cases	of which	40	per	cent.	died.
Schmidt	reports	25	cases	of which	45	per	cent.	died.
Zimmermann	reports	644	cases	of which	13	per	cent.	died.
Neiten	reports	149	cases	of which	35	per	cent.	died.
		3,005			35			

The great variation in the mortality rate from 13 per cent. to 50 per cent. can most readily be explained by the fact that, in these various collections, cases of hemorrhage, aneurisms and other affections are all included and variously commingled. When considering that in ligation of this for hemorrhage, death is most frequently the result of the loss of blood, also that in aneurisms the arterial walls are diseased and have lost the required elasticity essential for the establishment of the collateral circulation, it becomes apparent that such statistics are inaccurate. Concerning wounds of the carotid artery there is an old adage that it requires two minutes to ligate this vessel and four minutes to bleed to death.

The high mortality rate of most statistics is furthermore increased by the inclusion of the cases of ligations performed in the preantiseptic times. In fact, most of these statistics were gathered during this period. Neiten, in a collection of 57 cases of ligation which were preformed during the years from 1888 to 1893, and which, therefore, properly fell within the antiseptic period, reports a mortality rate of but 19.8 per cent. Zimmermann, from 64 cases, also falling within this

period, obtained a mortaliay rate of 13 per cent. From a closer analytical study, it is apparent that all statistics which have as yet appeared on the subject of carotid ligation are utterly valueless, with reference to any deductions as to the results of the permanent occlusion of this vessel per se, when performed during extensive operations upon the neck.

A much more definite conclusion as to the immediate effects and as to the direct mortality rate, is to be derived from the reports in which the carotid was deligated, in such affections as epilepsy, neuralgia, etc.

The following collection is illustrative:

	No. of cases.	Cured.	Died.
Velpeau	3	3	
Norris	8	8	
Pilz	34	33	1 (3 per cent.)
Wyeth	40	38	2 (5 per cent.)
Total	85	82	3

Mortality rate 3 per cent.

In ligation of the carotid artery preliminary to or in the course of major operations upon the neck the following are illustrative:

	No. of cases.	Cured.	Died.
Velpeau	26	16	10 (38 per cent.)
Norris	18	12	6 (33 per cent.)
Pilz	59	38	21 (29 per cent.)
Total	103	66	37

Mortality rate 36 per cent.

The comparison with the preceding shows that it is impossible to differentiate the various factors. A more exact conclusion as to the immediate effects of deligation of the carotid artery, during operative resections of the neck, is to be obtained from the statistics of Reyher of St. Petersburg. This collection of carotid ligations consists solely of those done as a preliminary measure to major operations on the neck. To avoid cerebral complications, pressure was applied over the artery during 10 to 15 minutes of every hour, for eight days

prior to the operation. In 21 such ligations but one death resulted. Weljaminaw, in 1881, reports 20 additional cases from the same clinic, making a total of 47 cases with but one death, or 2 per cent.

From the various statistics at hand for the mortality of complicated ligation of the carotid artery only two sources are available. One is the summary of those cases in which the deligation was performed for sundry nervous affections such as a preliminary measure to major operations on the neck. To just mentioned. It can be assumed that 2 or 3 per cent. is the true mortality rate of uncomplicated ligation of the carotid artery.

The cerebral complications following permanent closure of the common carotid are much more important. Lefort gives them as 30 per cent., out of which 73 per cent. ended fatally. Pilz as 32 per cent., with mortality of 5 per cent., while Friedlander gives it as 19 per cent. out of which 68 per cent. died.

The External Carotid.—Instead of ligation of the common carotid artery it has been frequently advocated that the ligation of the external carotid artery be whenever possible substantiated. That immediate mortality rate, as compared with that of the common carotid artery, is not visibly decreased, is indicated in the statistics of Lipps, in which among 130 in two, or 1.5 per cent., the cause of death was directly attributed to the ligation of the vessel. A thrombus in these two cases, as found post-mortem, extended from the point of the ligation into the lumen of the common carotid artery, and had caused a cerebral embolism. Wyeth, in his statistics of 67 cases of uncomplicated ligation of the external carotid artery, reports three deaths, or a rate of mortality of 4.5 per cent. But the pregnant and grave cerebral complications follow.

Inferior Laryngeal.—Section of the inferior causes motor paralysis of the corresponding side of the larynx, and of a portion of the œsophagus. The effects per se are not fatal. From the paresis of the œsophagus resulting from the division of the inferior laryngeal nerve as well as from the paralysis

of the epiglottis, when the superior laryngeal nerve, or the vagus above point of origin, is severed, the occurrence of the so termed vagus of inferior laryngeal nerve, tracheotomy has been advised by Shou, that in such instances of unilateral division of the vagus of inferior laryngeal nerve, tracheotomy be immediately performed, and the trachea be tamponed in order to prevent the aspiration of pneumonia. The pneumonia, which results in such instances, has probably but a slight factor in the extensive operation itself, during and after which blood and secretions can readily enter the respiratory passages.

Thoracic Duct.—During resections in the antero-inferior angle of the inferior carotid triangle the cervical portion of the thoracic duct has occasionally been injured or totally severed. The vessel in this position arches over the apex of the left lung and according to the usual description empties into the angle of the confluence of the left subclavian and internal jugular vein. More concise anatomical investigations have, however, revealed numerous variations in its course, position and termination. The arch which the duct forms in its course over the apex of the lung varies considerable. Henle, speaks of an instance in which the arch was situated two inches above the top of the sternum, touching the thyroid gland. The numerous variations along the whole course of the duct may assist in the more rapid establishment of collateral circulation. Anastomosis between the thoracic duct and the venous circulation other than its single normal confluence are known not to be unusual. These accessory communications are most frequently found near the termination of the thoracic duct, where these collateral channels, from three to six in number, empty singly into both the subclavian and internal jugular vein. According to Brinton, when these accessory terminal anastomoses are present each of the large veins receive one or more of these ducts. Collateral channels between the thoracic duct and the vena azygos major, and even the inferior vana cava have been found. The importance of these accessory channels is evident as their presence ensures the rapid re-establishment of the collateral

circulation when the main duct has been severed, death resulting directly from such operative injuries has as yet not been reported.

Other structures liable to operative injuries are the numerous superficial, sensory and motor branches of the cervical plexus. Of the sensory branches the auricularis-magnus and occipitalis major are anatomically and functionally of the most importance; their division is, however, followed by only a slight anesthesia of the areas innervated, and usually but temporary; neither does division of the motor branches cause grave disturbances, since the nerve supply of these muscles is derived from more than a single source, and the synergistic action of other muscles also compensates. It has been frequently noted that after incisions in the posterior portion of the submaxillary triangle a certain palsy of the lower lip is apt to occur. This paralysis arises from the depressor anguli oris and objectively becomes evident during the attempt to open the mouth or during laughing. In such instances the lip of the affected side cannot be depressed. Jaffe, from an anatomical investigation, has but lately determined that this muscle in question is innervated by an anastomosing branch between the supra and infraorbital branches of the facial nerve, the latter of which anastomoses with the transversalis colli of the cervical plexus to innervate the platysma myoides muscle at a variable distance below the angle of the mandible and is termed Ramus anastomoticus colli-mandibularis. It proceeds obliquely forwards and upwards towards the depressor labi-inferiores. It lies within the subcutaneous tissue and crosses the posterior portion of the submaxillary triangle so that in the vertical incisions of this region it not infrequently suffers division. Other nerves whose division certain authors occasionally seek to avoid are the descendens and comunnicans hypoglossi which by their anastomosis on the carotid sheath from the hypoglossi.

From the loop so formed arise the muscular branches to the sterno-hyoid, sterno-thyroid and omo-hyoid. The paralysis of these muscles which frequently occurs from the operative section of these nerves or their muscular branches and ne-

cessarily so in the resection of the carotid sheath or in a partial resection of the contained artery, vein or nerve does not as yet seem to have received any special surgical mention, and cannot therefore be of much importance. Division of the hypoglossal nerve causes impairment of motion of the tongue and is noticed in speaking and in swallowing, if unilateral compensation occurs. If bilateral, it is of extreme importance. The patient can scarcely make himself understood and cannot swallow. A patient of mine died of swallow pneumonia.

ARE PATIENTS WHO ARE NOT CURED RELIEVED BY THE OPERATION?

In general, if the growth cannot be completely removed, or if there is early local recurrence the answer is decidedly negative.

If completely removed the rate of growth is increased, the patient reduced in strength, the total suffering probably increased and the end hastened.

Death from glandular involvement is a decided gain over either that from original growth or from local recurrence.

In tongue cancer the "horrible fœtor," profuse and foul salivation, its pitiless, incessant, weary, racking, aching of the tongue, ear, face and teeth, (Jacobson) is much worse than death from glandular recurrence. Likewise, in cancer of the lip the death in the unsuccessful cases is usually due to glandular involvement, and constitutes a decided gain.

In cancer of the upper jaw, the great majority of the unsuccessful cases die of local recurrence, frequently within a feew weeks or months. "With the return of the growth there is usually a return of the pain and distress the operation was intended to relieve" (Butlin).

Unless curative, the operation is not palliative, and unless there is a reasonable prospect of cure, it should not be performed. In cancer of the tonsil the uncured cases usually die of glandular metastases and so produce less suffering than the original growth.

The unsuccessful lip cases often give a good measure of

relief; not so in those for the thyroid gland and the branchiogeneine carcinoma.

Technique.—Preparation of the Patient.—In cancer of the mouth, there is usually a large amount of infectious material and debris upon the mucous membranes and the teeth. The teeth should be put in order by the dentist, and the mouth repeatedly cleansed and disinfected before the operation. In cases in which there will be interference with feeding, there should be forced feeding prior to the operation. Rather than the usual preoperative fasting period, a modified diet should be continued and the stomach washed out just before the anesthetic. To prevent chilling during the operation, I have for the past year placed the patient upon a hot water bed designed by the Goodrich Rubber Co., to fit the operating table.

Preliminary Tracheotomy.—Irritation, cough, tracheitis, bronchitis, broncho-pneumonia, and even death may follow simple tracheotomy. Besides the patient is not able to clear the throat of mucus and wound discharges. On the other hand, our present means of controlling hemorrhage, the method of anesthetizing through rubber tubes passed through the nose, with tamponing the pharynx in suitable operations, removes the dangers and the difficulty for which tracheotomy is usually performed.

Special circumstances may require tracheotomy, but as a general proposition, it is no longer indicated.

Preliminary Administration of Drugs.—Hypodermatic injection of atropine to prevent inhibition of the heart, is indicated in all operations in which the superior laryngeal or the vagus may be involved. Unless some general contraindication exists, morphine should also be given so that during the deeper and more tedious part of the operation, but slight, if any general anesthetic will be necessary. The deeper parts of the neck and mouth have comparatively little sensory nerve supply. Preliminary administration of such drugs as strychnine, digitalis, brandy, etc., is not only useless, but harmful.

The Control of Hemorrhage and the Administration of

the Anesthetic.—A study of the mortality tables of the best surgeons of today shows that a very considerable percentage of operative deaths in the larger operations are due directly to hemorrhage. Of the larger number of deaths reported as caused by shock, exhaustion, and anemia, the principal factor, as Butlin has pointed out, is hemorrhage. To this must be added a very considerable number due to the entrance of blood into the pulmonary tract, causing death from toxemia or penumonia. More hemorrhage is caused by the innumerable smaller vessels than by the larger. If all these smaller vessels are picked up as they are divided, so that the loss of blood may be kept within the limits of safety and a clear operative field maintained, the operation is dangerously prolonged. The arterial blood supply should be controlled. This may be done by either permanent or temporary closure of the carotid artery. Permanent closure of the external carotid carries with it, on account of thrombosis and embolism, an immediate mortality rate of 1 to 2 per cent. Permanent closure of the common carotid in the cancer age of patients has an immediate operative mortality of about 3 per cent., with from 20 to 30 per cent. of cerebral complications, about one-half of which terminate fatally. Experimental and clinical research has shown that the carotids may be closed during the operation with perfect safety. The writer has temporarily closed the common and the external carotid with an instrument especially designed for that purpose, forty-three times, and has not in a single instance noted any unfavorable side effects. The free anastomosis necessitates in some operations a bilateral closure. This may be done, but there have been as yet, too few cases for deductions. The time required for supplying this instrument and closing the artery is usually from two to five minutes. The clamp should be closed enough to approximate the vessel walls, more than this may be harmful. This requires but little pressure. Venous hemorrhage is not by this means controlled. After the carotid is closed, the branches, when severed, discharge the blood they contain, amounting to a small passive hemorrhage. When the ves-

sels have been closed, the field of operation may be kept clearer of blood, as but few vessels require ligation. In all operations in the mouth excepting those in the pharynx, the following technique prevents blood from entering the trachea, secures free respiration, keeps the mouth open, the tongue well forward, simplifies the adminstration of the anesthetic, and removes the anesthetizer from the field of operation. This technique consists in:—

(*a*) Placing the patient under full surgical anesthesia.

(*b*) Cocainize the pharynx.

(*c*) Pass as large a rubber tube through each nostril as it will permit, back to the level of the epiglottis, cut the tubes off as long as necessary, to remove the anesthetizer from the field of operation.

(*d*) Pull the tongue well forward.

(*e*) Firmly pack the pharynx above the epiglottis with large pieces of folded gauze. Arrange the packing so as to make pressure and counter pressure against the soft palate, pharyngeal wall and pillars, posterior hard palate, and the base of the tongue. This creates and maintains an air chamber in the lower pharynx throughout which free exchanges of air may take place, by means of the rubber tubes between this air chamber and the outside air. The packing may be so arranged as to give a free field where desired. In removal of the tongue, this organ may be "packed" so far forward as to protrude well out of the mouth. The lower jaw is simultaneously well opened. The pressure against the base minimizes hemorrhage. Neither forceps, silk loop nor other mechanical means for controlling the tongue are needed. In operations on the palate, neither tongue depressor, nor mouth gag is required. None of my cases have vomited. In that event the gauze may be removed in an instant. As for mucus, the atropine controls it fairly well, but the gauze packing extends over the mucous producing area and absorbs it. The operations performed by this method have passed off with surprising ease and smoothness.

Plan of Dissection.—This dissection should be as logical and as thorough as in the operation for cancer of the breast,

and should be as definitely planned. First, temporarily close the common carotid artery of the neck, extend the incision upward to the angle of the jaw. From this point make lateral incisions parallel with the lower border of the jaw. Reflect the skin over the entire area of possible glandular involvement. Palpate the field. If glands are enlarged, divide the sternomastoid muscle transversely. Ligate the internal jugular vein in two places and divide between. Then from below upward remove all the lymphatic bearing tissue, which amounts to a complete removal of the cervical fascia. Remove every structure lying between the integument and the deep muscular plane of the neck. Unhesitatingly remove, if necessary, the internal jugular, sterno-mastoid, vagus, external carotid, omohyoid, stylohyoid, submaxillary salivary gland, the hypoglossal nerve, in short, every structure on one side of the neck except the internal directly invaded. In unilateral dissection, there should be but two objectives, the removal of the disease and the preservation of the blood supply of the brain. I have obtained three years' cures in extensive glandular metastases by this radical procedure. Removal of individual glands is to be condemned. Comprising the technique of trying to save structure not essential to life or comfort, is a misrepresentation of the question on a par with that of the older surgeons who sacrificed life by trying to save a part of the breast.

Should the Neck and the Mouth Dissection Be Done at the Same Operation?—This question is best determined upon the merits of each individual case. If in doubt, it would be better to remove the primary growth first, then the regional lymphatic system several weeks later. It must be remembered that secondary hemorrhage still occurs in cases in which there is infection, such as is likely to occur when the neck wound connects with that within the mouth.

After Care.—Special nursing, sufficient nourishment, warm, moist air in mouth cases, getting the older patients up almost from the first are most important.

Summary.—In the past three decades there has been a continuous decrease in the operative mortality, and with

the single exception of the branchiogenic cancers, even a more notable increase in the percentage of cures has been accomplished. Especially in the last decade there has been evidence of more confidence in operations as indicated by an increased number of cases submitted early. The supreme importance of early diagnosis and early and radical operations is becoming widely recognized. The same may be said of the so-called "pre-cancer stage," especially of the tongue. Except in cancer of the upper jaw, the disease is now regarded as involving the regional lymphatic system as well. The disease may be found in the lymphatic vessels, as well as in the lymphatic glands. It rarely extends to other parts of the body. Physiologic and clinical evidence shows that severing the thoracic duct causes but little disturbance owing to its free anastamoses. That the effect of resection of the internal jugular vein are practically nil; that unilateral resection of the vagus does not alter the heart's action, the respiration, nor the digestion, but produces a permanent hoarseness only. That division of the superior laryngeal causes anesthesia of a part of the larynx, but pneumonia is improbable; that division of the inferior laryngeal causes paralysis of the corresponding vocal cord, but interference with respiration is not marked; that the division of the spinal accessory has but slight effect on account of the double nerve supply of the sterno-mastoid, and synergistic action of other muscles; that the division of the hypoglossal causes temporary interference with speech, and swallowing, but compensation occurs; that the submaxillary salivary gland may be removed without symptoms; that the removal of the sterno-mastoid muscle is not followed by tortocollis, etc., on account of the synergistic action of other muscles; that the complete removal of the lymphatic system of one side does not produce a psuedo elephantiasis of the face and head; that the permanent closure of the common or internal carotid is attended by an operative mortality of about 3 per cent., but in the cancer period of life from 20 to 30 per cent. of cerebral complications follow, about 50 per cent. of which prove fatal; that temporary closure of the carotid by means of a

special clamp as shown in the writer's forty-three cases, in which neither death nor cerebral complications occurred, is both efficient and safe. These physiological and clinical data lead to but two objective points in a unilateral operation for cancer of the mouth or neck, viz., complete removal of the disease, and preservation of the blood supply of the brain. If necessary, sacrifice every other structure between the skin and the plane of the deep muscles of the neck. Loss of blood is the greatest operative difficulty and danger. Usually the cases of least shock are the cases of least hemorrhage. If hemorrhage is likely to be considerable, the common carotid should be closed during the operation. In the mouth cases, the anesthetic may be administered through rubber tubes passed through the nostrils to the level of the epiglottis, with the tongue well drawn forward. The pharynx may be then packed with gauze, so as to form an air chamber in the lower pharynx, effectively preventing blood from entering the pulmonary tract. The dissection should be made on the same plan and as thoroughly as in the radical operation for cancer of the breast. The greater ease and certainty with which diagnosis may be early made in this region, the rarity of its extension beyond the glands of the neck, should enable the surgeon to obtain even better results here than in cancer of the breast. the hope of the patient lies in early diagnosis, early operation, and a logical technique.

PAPERS.

I.—SOME EXPERIENCES WITH THE X-RAY AS A THERAPEUTIC AGENT.—REPORT OF THE CURE OF A CASE OF ALVEOLAR MELANOTIC SARCOMA.

BY EDWIN WALKER, M.D., PH.D.,

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To Finsen belongs the credit of first studying in a scientific manner the therapeutic action of light. His remarkable results and earnest work have opened up a most promising field. The discovery of the Roentgen rays, and the scientific study of these, with the Becquerel and violet rays, have further stimulated thought and research.

We now know that the spectrum we see, is only about one-eighth of the real one, and that in the dark field, there are numerous other rays which possess remarkable chemical and photographic reaction. What effects these will have in the cure of disease, none can imagine, but certainly the effect of the Roentgen ray in some hitherto incurable malt-dies, gives reason for great hope.

It is not my purpose to go into the general discussion of the treatment of cancer by the X-rays. Many interesting articles on photo-therapy have been published in our recent literature, but the whole work is so new, that we can only glean from them the most general principles. It would be hardly profitable to review them at this time. I will give a brief outline of my own observations in the effects of X-rays on malignant disease.

In the fall of 1901, I was consulted by a physician who was suffering with a post-peritoneal malignant growth.

At his request, we took a skiagraph which required a twenty-minute exposure. He returned a few days later, saying that he felt much better, and that he believed the growth was smaller. Our examinations did not confirm this observation, but at his request, six or seven applications were made at intervals of a week, and for a while he thought he was much better. The disease, however, advanced to a fatal termination.

In this case, my confidence in the therapeutic value of the ray was so little that I did not pursue the treatment with any enthusiasm, but as I look back to it now, after further experience, I really believe that it did do some good, and that a more vigorous treatment might have yielded better results.

The case which I desire especially to report was so remarkable in its course and termination as to be for me, an epoch in my professional life. No previous experience has produced so profound an impression. To see a rapid-growing sarcoma heal in a short time under any treatment, is truly extraordinary. Such patients are doomed by any known application of remedies. Here was a man grasped from certain death before my very eyes—can you wonder at the deep impression made!

The fortunate subject of this sketch was Jacob Saelwachter, of Wadesville, Indiana. He was thirty-one years of age, and a farmer. He came to me February 20, 1902. On the right cheek, just in front of the ear, was a black tumor protruding from the surface, one and a half inches in diameter. There were no enlargements of the glands of the neck. Under cocaine anesthesia, the growth was excised well out into healthy tissue. The wound was united with silk-worm gut sutures. It never healed.

Evidence of return could be seen in two weeks, small black spots appearing about its edges, and about this time an enlargement appeared under the angle of the jaw, which grew with great rapidity.

On March the 22d, under general anesthesia, I made a second operation, excising the old wound widely. The incision was continued to the neck, and I removed the tumor, which had extended deep down between the vessels to the vertebra. The sterno-cleido-mastoid muscle was infiltrated for more than an inch. The diseased portion was thoroughly excised. At various points in the bottom of the wound, black places could be seen. These were curetted, only to reveal

the greater depth of the infiltration. The operation had lasted nearly an hour, when I concluded the complete removal was impossible. The wound was packed with gauze. There was no infection, still it was soon evident that the morbid process was again advancing. The wound showed no disposition to heal, and the surrounding tissues were rapidly infiltrated.

On May 1st, as a last resort, it was decided to try the X-ray. It was really a forlorn hope, for it seemed almost impossible to favorably affect a mass which was now hard and extended to great depth. The gaping wound was two inches deep, covered with sluggish granulations, and the sides infiltrated involving almost the entire neck on that side.

Considering the gravity of the case, it was decided to push the treatment, even at the risk of causing some painful reaction; the danger of a burn having been fully explained to the patient.

The current was generated by a static electrical machine. The tube was a "Gold Medal," No. 3572. It was high most of the time.

At first the tube was placed at six inches from the patient, but later it was brought as near as three inches. The shoulder and face were protected by a lead mask. The first seance was ten minutes, but the time was increased to twenty, and later, thirty minutes. A few applications were made on alternate days, and after that, were given daily. Occasionally the reaction was uncomfortably severe, and the treatment had to be suspended for a few days. At no time was there anything approaching a burn, nor was there any serious discomfort.

No black spots appeared after the first exposure, and after the third there was apparent improvement, and the skin had entirely cicatrized in two weeks. The infiltration gradually faded away. The last place to be affected was just behind the angle of the jaw. It occurred to me that the bone might be protecting it. The position was so changed as to allow the rays to come from behind, after which the place soon softened and disappeared.

By the last of July, there was no evidence of the disease except the cicatrix. The applications were made once a week for another month, and now we have him report once a month. The growth never occasioned severe pain, but there was a drawing, uncomfortable feeling. This disappeared as soon as the treatment was begun, but would always return if it were suspended for a few days.

There was another interesting feature worthy of mention. In adjusting the head mask, he often steadied it with his hand, so that two fingers were exposed to the ray. They became very red and shed their nails. This shows that the nutrition of the tissues is profoundly affected by it. The fingers since guarded from exposure, are regaining their normal condition.

The tumor removed at the operation was hardened and examined by Dr. Wm. R. Davidson, who made the diagnosis of alveolar melanotic sarcoma. A specimen was also sent to Dr. B. F. Cline, of the Post-Graduate Medical School of New York, who confirmed the diagnosis.

We have now under treatment a number of cases, some of whom show improvements, but the time is too short to judge of the effects. Two of them have been entirely relieved from pain.

We had considerable trouble with our tubes, five in all; they would become too high when much used. Baking helped them sometimes, but not always.

Photo-therapy opens up a very interesting field for investigation, which I will not here discuss, but briefly report a few studies we have made. It does not seem to me that theories can be of any great value while our information is so meager. Let us gather the facts first.

To me, the most important question is whether or not the X-ray is germacidal in its action. The parasitic origin of cancer is not established, although the evidence lends some probability to it, and whether it is or not, the effect of the ray on germ life comes up in its application to a wide range of diseases. If we could kill germs in tissue without destroying it, we would have a most potent remedy.

In conjunction with my associates, Dr. James Welborn and Dr. Leartus Owen, the following experiments were made:

EFFECTS OF X-RAYS ON BOUILLON CULTURES OF PYOGENIC GERMS IN TEST TUBES.

Aug 9.—Three tubes of sterile bouillon, marked 1, 2, 3, inoculated from pus of suppurating wound.

Aug. 10.—Culture media turbid. Shows staphylococci and diplococci, with methylene blue.

Aug. 11.—No. 1 and 2 exposed to X-ray.
Time, 10 minutes. Distance, 12 inches.
Tubes 1' and 2' inoculated from No. 1 and 2.

Aug. 12.—Tubes 1' and 2' show growth of organisms.
Tubes 1 and 2 exposed for second time to X-ray.

Time, 10 minutes. Distance, 12 inches.
Tubes 1" and 2" inoculated from 1 and 2.

Aug. 13.—Tubes 1" and 2" show growth of organisms.
Tubes 1 and 2 exposed 20 minutes to X-ray.
Tubes 1''' and 2''' inoculated from 1 and 2.

Aug. 14.—Tubes 1''' and 2''' show growth of same organism as the original tubes.
The glass of the tubes seems to obstruct the passage of the rays, giving a dark shadow with the fluoroscope. Hence, we concluded to expose cultures without the intervention of glass.

EXPERIMENTS CONTINUED WITH BOUILLON GELATIN MEDIA IN PETRI DISHES.

Aug. 16.—Three plates, 1, 2, 3, inoculated from pus of carbuncle, showing staphylococci.

Aug. 18.—All three plates show extensive growth of the staphylococci and also a fungus.
Plates 1 and 2 exposed to X-ray for 30 minutes. Distance, 10 inches. Covers were removed from plates during exposure. After exposure three culture tubes, 1', 2', 3', were inoculated from plates 1, 2, 3.

Aug. 19.—Culture tubes 1', 2', 3', all show cultures of organisms.

EXPERIMENTS WITH RABBITS.

Two rabbits inoculated in each hind leg with pus showing staphylococci.
Localized abscess resulted at the site of each inoculation.
Rabbit No. 1 exposed to X-ray for ½ hour.
No change resulted in abscess, but rabbit died on second day.

Sept. 29.—Rabbit No. 2 exposed for ½ hour, the rays being directed onto the right leg.

Oct. 1.—Rabbit in good condition. Infection the same. Exposed right leg ½ hour.

Oct. 3.—Abscesses are much diminished, but no more so in right leg than in left.

In conclusion, I would again remind you that all our work in this line is new. Further experience will be required to determine the exact position of the X-ray as a curative agent, and the permanency of its effects. It will be very interesting

to study the method of its action, and doubtless many improvements will be made.

In the meantime, we have much to encourage us, for if only a small proportion of hitherto incurables are rescued by it, we will be well repaid for the trials so far made.

I cannot close without the remark, that while this treatment is still under investigation, we should not forsake previous well established principles. Growths should be excised where accessible, and all other established means of relief should be employed, and after that the X-ray.

But in all cases not amenable to other methods, the X-ray should be given a trial.

II.—THE RELATION OF THE SO-CALLED "X-RAY BURN" TO THE TREATMENT OF MALIGNANT GROWTHS.

BY J. RUDIS-JICINSKY, A. M., M. D., M. E.,

CEDAR RAPIDS, IOWA.

So long as the radiotherapy remained a laboratory science very little attention was paid to the dosage or the measurement in the regulation of the electrical phenomena which takes place in a Crooks' tube in action. The application of the X-ray to practical purposes in diagnosis, and treatment in medicine and surgery have changed all this; and especially the rapid and comparatively recent development in radiant matter, and of the application of the ray in the treatment of malignant growths, lupus, favus, trichophytosis, sycosis, folliculitis, acne, ecezema, psoriasis, glandular tuberculosis, Hodgkins' disease in advanced stage, various external glandular enlargements of uncertain character, keloid, fibroids, in reducing size of the tumor, sinuses, nevi, etc.

Allow me to say a few words about the action of the rays first, in order that you may afterward be able to appreciate my object in making my experiments. The results of these show what the X-ray can or cannot do for the surgeon, besides its value in diagnosis. But do not think, if you please,

that I should consider for a moment the X-ray as a "cure all," knowing that it should be only the adjunct to our modern surgery and nothing more; the adjunct, which has to and must remain with us only in capable hands of our profession and nobody else.

If we apply a chemical or electrochemical irritant to the cells of living tissue, the cells which are the offspring of one original cell, the ovum, we produce in comparatively short time a regeneration of tissue with new cells derived from some pre-existing cells by division of their bodies, and bring about a proliferation or other changes. In this irritation we have three factors in determing the special effect on the cell:

1. The condition of the cell; that is, the amount of resistance which the rays will encounter.
2. The amount and intensity of the rays; and,
3. The character of the rays.

Under the influence of such irritation the parenchymatous cells, connective tissue and endothelial cells are apt to swell and become more granular. These granules being albuminous seems to be developed from the protoplasm of the affected cells. When the irritation is moderate in degree the cells may return to their normal condition, but if the irritation is prolonged, or given in excess the change may be progressive, leading to regeneration, absorption, re-absorption, or to the total destruction of the cell. The destruction may begin with the decomposition of hemaglobin from extravasated masses of red blood cells, or simple pigmentation in the skin, and end with the death of circumscribed portion of tissue. In other words, we have produced by the means of an irritant an inflammatory process with varied structural changes in the tissues. And such an irritant of electro-chemical action, we have in the ray of Prof. Roentgen. What are the rays? We do not know just what the X-rays are, nor why they are produced under the conditions existing in a vacuum tube. But we do know that by following certain processes and making certain chemical combinations, we can make as much X-rays and in such proportions as we want or need for penetration of certain objects or for therapeutic

purposes in those cases where the proper, intelligent and systematic irriation may lead to special electro-chemic inflammation with regeneration, absorption, reabsorption, or total disappearance of malignant growths, often without any apparent sloughing.

From the foregoing it is apparent that we may, with the help of the X-ray, attack the healthy tissue and produce pigmentation, erythema, dermatitis, or even necrobiosis, on one side, and by the same electrochemical effect cure the new growths most dangerous and hitherto not yielding to other treatment, than the knife of the surgeon, and that yet, with the dreadful fear of possible recurrence. The relation of the so-called "X-ray burn," and our new treatment in malignant growths is thus—I hope—proven beyond the doubt. If we are not careful, we may do harm, but if we administer enough of the rays without injuring the patient and yet enough to cause retrogression of the growth, we may benefit the patient wonderfully. It is curious to note that while the rays pass completely through the parts submitted to them, it is first the superficial surface which is markedly affected, and this fact alone seems to show already that an electrochemical process takes place with the irritation in the production of the results, sufficiently encouraging to warrant continued research.

Definite measure of the "dosage" of raying has to be found in every individual case, and the choice of a "soft," "medium soft," or "high vacuum" tube differs accordingly. Superficial growths, with no intervening sound skin, may be treated by a "soft" or "soft medium" tube, backed up not more than a two-inch spark gap; while internal growths are attacked better with "high vaccum" tube, backed up by a spark gap of not less than four inches, from the first. In regard to the exciting apparatus, it make no difference whether it is a coil or a static machine of good make. After the proper source of electricity, we need to have our tube at its best, know our case thoroughly, remembering that the electrical resistance of each individual differs. There is such a thing as individual susceptibility of patients, especially in those with or-

ganic spinal lesions, where sensation is somewhat diminished and where also some trophic lesion might be supposed to exist. Some patients experience peculiar fatigue that they can hardly breathe; others are inclined to free perspiration, which has to be watched as to its alkalinity or acidity; others have a vasomotor irritability, or an irritability of all the tissues; in other words, there are a multiplicity of conditions which make a living organism react differently under the X-ray. It is not, therefore, every patient that we can at once submit to X-ray treatment, and allow me to state right here that there are many unreported failures. The raying must certainly be employed systematically to secure some results, with an intimate acquaintance with physics, anatomy, physiology and pathology, and with all the laws which govern the action of the varied manifestations of the rays on the living tissues.

From my experiences and extensive experimentation on guinea-pigs, rabbits, mice, etc., I have found that the effect of this form of electricity on the tissues is first stimulating and then irritating, and that the rays seem to have a selective power upon the diseased tissues especially. We are dealing with a very rapidly interrupted current going through our tube, producing the X-rays, the intensity of which is not, however, of so defined a character as to enable us at the present time to distinguish exactly the rays which have the curative effect, or those which may cause severe injuries. We may get various rays from one and the same Crooks' tube at different, or even the same times of exposure, differing so widely in their effects that these rays may be almost said to differ in kind, as well in degree. The "soft" or "low vacuum" tubes are most likely to produce injury, but in treatment of superficial malignant growth give us better results, and we select them for our purpose, when their "burning time" is comparatively determined, and the resistance of our patient approximately estimated, remembering that the different tissues present different resistances, and that the resistance in the same tissue varies greatly under different circumstances. At the time of exposture the patient shall not experience an

uncomfortable sense of heat; in fact, no sensation whatever. If he does, the treatment must be stopped at once.

The time required for the treatment of this kind is long, perhaps, but has to be taken into consideration in all operative cases where the raying shall clear the field of infection first before the radical operation. To lessen the amount of sepsis, we have to follow with more radiance, to secure a better scar and prevent possible recurrence. The raying is not burdensome, in view of the palliative results, which occur almost in every case immediately, and the benefit obtained in some cases in a few weeks.

In operative cases the knife most assuredly must be employed first, or, as stated already, in combination with raying; in inoperative cases of sarcoma, or carcinoma, the rays, in attacking superficial parts, may give great relief, not only from pain, but give us some hope. In all cases so treated we have to expose not only the area evidently diseased, but the surrounding tissue for a little distance, especially where there are some lymphatic nodules of uncertain character, or hard and uneven nodules of infection. This way we produce first stimulation, then irritation with a mild electro-chemic inflammation, and even pigmentation in and about the diseased tissue, gradually increasing its severity until absorption, reabsorption and regeneration take place. In some cases we may employ the static brush discharge from a wooden ball electrode at the proper time, to tone up the patient, and avoid undesirable results from prolonged raying.

In extensive malignant growths we do not need any shield protecting the hair and eyes only, but in smaller lesions for protecting healthy tissues. After experimenting with various substances, I found that lead, being opaque, is the best shield. I have adopted the following method: The parts unexposed are oiled with olive oil, and protected with a few layers of tinfoil covered with one layer of rubber sheeting towards the tube. The tinfoil itself or sheet lead may become charged with a current by induction or from the wires of the tube, and give us or the patient unpleasant shocks, which will be prevented by the rubber. The scar or restitution of the tissues in all cases thus treated is smooth, and better than with other methods of treatment.

TABLE.

SUPERFICIAL CARCINOMA	DEEP SEATED CARCINOMA	SARCOMA.
Since 1900-1902. 18 cases seemingly cured. Six failures. Three under treatment. Ten out of 18 combined with radical operation. Age over 40. Radiotherapy tried first in epithelioma; for carcinoma of the breast, ray and knife both.	Ten cases since 1900. Pain relieved in some at once. Results negative. Surgery should be the first resort. Evidence not sufficient yet in regard to the rays. Open to doubt.	Since 1901. One case under treatment, 5 inoperable cases benefited, 2 cases absorbtion and total disappearance without sloughing. Time will show if there is a cure. Influence upon the pain marvelous. Ten failures. In glandular sarcoma operate and use rays also.
TUBERCULAR GLANDS	**LUPUS**	**TUBERCULAR LARYNGITIS**
Since 1900; two cases under treatment. Nineteen failures. In some cases invasion of lungs or recurrence in about 6 months. Four cases benefited, but have to wait for development.	Since 1896. September 2nd, 1898, two cases reported cured. — "X-Ray Journal." Nearly all cases treated benefited, and 10 cured with 3 failures. Scar cosmetic. One case under treatment, doing well. There is no doubt as to favorable action of raying.	1902. Six cases under treatment, doing comparatively well. Two cases complete failure.

From the above related actual experience we may judge about the possibilities for the rays in the near future and be able to know how to use this force. But my communication would not be complete if I would not recommend at least the following of some rules, with all the other rules which every operator with his own experience shall find out himself:

1. Know the capacity of the apparatus and the tube in which you have learned to observe the quality of the vacum backed up by a certain length of spark gap before radiance appears, and know all other points of individuality of the tube. No tube is to be held so that the field of the rays is not established properly, and the ray at its best. For superficial growths use a "soft" or a "soft-medium" tube with a spark

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gap of two inches, for internal growths "high vacuum" tube with a spark gap of four inches. Try the tube before each application, remembering that the tube will behave very differently at different times. Make fluoroscopic observations first, and have on hand a number of tubes of the same make and supposedly same vacuum, so that the treatment may be conducted throughout under as nearly as possible uniform conditions.

2. Make a thorough examination of your case; know your patient well; observe the corpulence and age, his disposition and resistance. Protect the hair, eyes and the healthy tissues, if necessary, taking care to ray all suspicious parts in as large area as possible.

3. The length of exposure depends not so much on the time during which the tube is in action, but upon the actual time of best X-ray production. Exposure is to be made according to each individual case for five minutes first, and after a week, about ten minutes. When, after two weeks, no reaction follows, the patient may be irridated every second or third day and at least daily, until intense reaction manifests itself at the distance of six inches or less. If itching of the skin ensues during the course of treatment, a pause of few days should be made, parts exposed observed, and static brush discharge with wooden electrode given; or if there should be a peculiar irritability of the nerves, or tissues, the skin should be washed with alcohol and warm water—half and half. In internal growths, we expect to get tanning of the skin, however.

4. After few seances wait for reaction, if necessary, and see if the raying has marked influence upon the pain. Relief comes in nearly all types of malignant tumors very soon. If it should happen that one or few isolated nodules remain after the general surface of the growth begins to look better, a change of treatment is indicated, and the nodules have to be attacked more vigorously. If it is thought unwise to treat the whole of the diseased surface at once, begin to treat the growth at its edges.

5. Watch the progress and results of the treatment carefully and see whether the case is operative or not, or if the

raying should be combined with a radical operation, after which more raidance must be employed. Do not lose time with raying, if there is no show for it. The experience in all this and similar cases is the best guide.

6. To protect ourselves, and to be prepared for all occasions we should hang up in a conspicious place in our office and laboratory a sign like this: "X-ray examinations and treatments at the RISK of the patient."

III.—THE X-RAY TREATMENT OF CANCER, WITH REPORT OF SUCCESSFUL CASES.

BY EVERETT J. BROWN, M.D.,

DECATUR, ILLS.

It is not generally recognized that we have in the X-ray a new and decidedly valuable means of checking the growth of many low grade tissues; that this influence is more marked upon superficial and early cases, is also well known, yet recent results show that even in far advanced and inoperable cases, total disappearance may occur.

X-ray therapy is yet in its infancy, and it is incumbent upon us as pioneers in this work to truthfully record our experiences, announcing our failures as well as our successes.

My work has been done with both a static machine and a coil, but my preference is for the static machine. The main objection to a static machine is that it sometimes refuses to work on account of moisture; it also requires much cleaning, is not portable, occupies more space and is quite expensive.

The light, however, is steadier than that from a coil, but is of equal therapeutic value and is better for both photographic and fluorscopic work.

I place the patient in the recumbent position in all cases, regardless of the location of the growth to be treated. In this way the patient is more quiet, is less restrained and the shields are self retaining. In superficial cases I never have the tube farther than three or four inches, more often only one or two inches away. The time of exposure varies from twelve to

twenty minutes; daily for three or four days, then every other day until reaction appears, when treatments are discontinued for a week or more. I protect the patient with shields of thin tinfoil between layers of rubber and cloth; an opening a little larger than the size of the growth is cut in the shield. If the shield is allowed to come in contact with a large area of the body, the unpleasant prickling due to the current developed is not felt; or the shield may be grounded by connecting to a gas fixture. Williams of Boston uses a tube holder in front of which he places a grounded aluminum screen for the protection of the patient. I have seen Carl Beck of New York, treat several cases of carcinoma of the breast without any shields whatever, so as to have the influence extend as far as possible. In treating an epithelioma of the ear and the external auditory canal I protected the tympanum by dropping into the ear a leaden bullet to which was welded a silk thread for easy removal.

The Crooks's tube is the part of the apparatus which gives us all the greatest trouble, and the manipulation of the vacuum is the black beast of X-ray work; each worker must learn this detail for his own machine and for each individual tube. I keep tubes of several varieties and find that by resting the ones that have become too hard for use, they are soon softened sufficiently. The expressions "hard" and "soft" as applied to tubes are really relative, depending upon the apparatus used and work required. According to Morton a tube containing only one-millionth part of the normal amount of air is said to be hard, and one containing only one-thousandth of the normal amount is soft. A tube which is too hard for a static machine may be just right for a coil. A hard tube does not allow the current to pass easily through it, hence it is said to be high or of high resistence. This resistance to an intense vacuum may be so great that the current will no longer pass through it but will go around it, with great danger to the life of the tube or at least of putting it temporarily out of action.

I use mostly the regular type of German tube. Have not had very good results with the Sayer tube which has an ex-

tra bulb containing a chemical to be heated and vaporized, thus reducing the vacuum. The German tube, like all tubes, becomes harder with continued use, but may be softened by attaching both positive and negative wires to the two discs at the anode extremity of the tube.

X-ray Burns.—X-ray burns differ from ordinary burns in several particulars. A period of incubation occurs and the burn is not evident for at least several days after the exposure, often only after two weeks. The various stages of a severe burn, such as erythema, vesiculation and desquamation are much slower in their evolution than in ordinary burns. In one case a slight burn of the shoulder, repeated desquamation with constant pruritus has occurred. Before beginning treatment I make it a rule to tell all patients that X-ray therapeutics is yet in its experimental stage and that as the individual idiosyncrasy cannot be determined by any means at present at our command, they must assume all responsibility should a burn occur. Burns occur more readily upon the body and extremities than upon the face, owing to the greater vascularity of the latter; for the same reason they heal more readily upon the face and are not so liable to leave unpleasant results, such as repeated desquamation, prutitus and burning; prominent surfaces such as the point of the shoulder, the edge of the ear or the chin are frequent locations of accidental burns.

By careless use the operator's hands are easily burned. The tube or shield should not be adjusted after the current is turned on, and in using the fluorscope one should stand several feet away and the palm should be directed towards the tube. Beck uses a glove lined with tin foil. A dermatitis of the dorsal surface of four fingers from which I have just recovered caused me little inconvenience, except that it prevented the use of the fingers for percussion, rendering them somewhat stiff from swelling and quite sensitive after desquamation.

Relief from pain does not always follow in the X-ray treatment of malignant growths, although the effect is quite constant. If the treatment is energetic, the discharge in-

creases, large sloughs may occur and there is often no improvement in the odor of the discharge. Cases which have been bleeding readily show considerable improvement in this regard.

In cases of superficial growths I always endeavor to produce a reaction or surface burn before temporarily discontinuing treatment; in fact, the treatment of all my cases has been in relays—by which I mean the giving of energetic treatment for three or four days, then less frequently and with shorter exposure for a few times in anticipation of the reaction, and when this occurs, total discontinuance for one or two weeks so as to determine what impression has been made upon the growth, and then if necessary, beginning another relay of treatment.

The effect of the rays upon malignant tissue varies with the location, size, and the amount of normal tissue, such as skin, covering the growth. The skin is wonderfully resistent to the penetrative effects of the ray, hence the difficulty of treating growths having a normal skin covering. On the contrary, I have noticed that tumors or involved glands located beneath an ulcerating surface are easily influenced and successfully treated; on this account, I see no reason why we would not be justified in removing an area or normal skin over a tumor, say of the breast, in order to allow of more ingress of the ray.

I have treated fifteen cases of malignant growths with the X-ray; these include epithelioma of the face, of the lip, of the ear; rodent ulcers, sarcoma of the jaw, cancers of the breast and of the liver; four have recovered, three are nearly well, seven are yet under treatment and show improvement, and one, the supposed liver cancer, shows only relief from pain.

CASE I.—Man, aged 81; epithelioma the size of half a dollar and elevated one-fourth inch above the surface, on left cheek; duration, twelve years, but lately has been growing more rapidly. Treatment every other day by a medium tube, for twelve minutes each, at a distance of three to five inches for three weeks; after the tenth treatment, reaction occurred, but without pain; depilation in neighborhood

is marked Treatment discontinued for twenty-five days, at end of which time healing had occurred with disappearance of growth, excepting a small portion of upper edge. Three more treatments at intervals of four days produced a second reaction and total disappearance of the mass, leaving a smooth and soft surface. Duration of treatment, ten weeks; number of treatments, nineteen.

Case II.—Dr. C. Epithelioma, the size of a dime on left side of nose; duration, three years. Eight exposures, one every other day, fifteen minutes, at three inches caused a decided reaction, with a sloughing effect resembling that of a caustic and marked dermatitis of surrounding skin. Ten days after the last treatment the inflammation had subsided, leaving a smooth, well-healed scar.

Case III.—Mrs. B. Age, 60. Epithelioma of forehead, the size of a five-cent piece; this growth I had treated two years previously with Bougard's paste; did not recur for eighteen months; seven treatments were successful in reomving growth; the first evidence of dermatitis was on the fourteenth day and after five treatments.

Case IV.—Male; age, 50. Two epithelial cancers, one on each cheek; eight exposures during a period of five weeks caused entire disappearance.

Case V.—This shows the most remarkable results of any in my series; woman; age, 66.—Ulcerating carcinomas of both breasts and both axillary spaces; right breast had been entirely destroyed by a schirrus of nine years duration, leaving an ulcer the size of the palm; both axillæ contained many involved glands, some of which had broken down; the skin of the chest showed many subcutaneous cancer nodules. About thirty-five treatments have been given at varying intervals, depending upon the reaction, all at a distance of four inches. After a few treatments there was great relief from pain and at this writing all ulcerating surfaces have healed, no glands are to be felt in either axillæ most of the subcutaneous nodules have disappeared and the patient can place both hands over her head, which feat had not been accomplished for over a year. I had promised this patient nothing, nor had I hoped for such results, yet this case has taught me that none such are entirely hopeless.

Case VI.—Epithelioma of the lip. A man; age, 81. Duration, about three years. Frequent very severe hemorrhages have occurred from the ulcerating surface; the tumor involved one-half of the lower tip, causing much protru-

sion. Thirteen exposures of ten to twenty minutes, at a distance of three inches, every third day, produced a marked reaction; after an interval of sixteen days without treatment, the growth was reduced more than one-half. The second relay of treatment, at longer intervals, caused a second reaction, so that at this writing only a slight induration remains. I have begun a third relay, and have no doubt of complete cure.

I am also treating two keloids; one case, a young woman, having a keloid on the lobe of each ear after piercing for ear-rings; these have been operated upon twice, but each time with recurrence. The other keloid is a large one upon the shoulder of a boy as the result of a burn. As yet there have been no results in either case.

A case of epithelioma of external auditory canal is giving much trouble from its location, but I have now obtained a good reaction and will expect a cure. In this case I protected the ear drum with a bullet dropped into the ear and held by a thread.

A supposed carcinoma of the liver shows no result, except relief from pain. The same may be said of a deep carcinoma of the breast in which operation is refused.

A recurrent sarcoma of the jaw, after ten treatments, shows improvement and great decrease of pain.

Another case of epithelioma of the end of the nose in a woman, had been treated twice with caustics, but is now nearly healed after a second relay of X-ray treatments.

I show here on one card a picture of three far advanced and surgically hopeless cases of malignant growths in old men. One is a large sarcoma of the face and neck, and the two others are cases of advanced rodent ulcers, in each of which one eye is destroyed; these apparently hopeless cases have only been under treatment for two to four weeks, but all show marked effect, and although I have given them little hope of benefit, yet I have a growing suspicion that I may be happily disappointed in the outcome. A report of these cases, whether favorable or unfavorable, will be made later.

Even with only these few cases to judge from, and with

the constantly increasing record of the successful results of other workers in the field, I think we are justified in exhibiting a little enthusiasm in Roentgen therapy; and when the public learns that we now possess a painless, bloodless and comparatively harmless means of curing many forms of cancer, we will no longer see the advanced cases in patients who, from a dread of the knife, have postponed treatment and suffered in silence for months and years.

That this method will supplant surgery in all superficial forms of cancer, there can be no doubt in my mind. It is not nearly so destructive as the knife, will prevent many an amputation of leg or arm, will preserve the tissues about the eye or mouth or alæ of nose where even slight cutting is so destructive to both appearance and function; there are none of the disadvantages or dangers of an anesthetic, and the consent of the patient is easily obtained. This treatment should be adopted in both early and late cases. In early cases, because the results are so certain, the method is painless, bloodless and the cosmetic effect is good. It should be used in all late cases, because it offers the only possible hope for the patient, who is now beyond the reach of the knife. The recent case reports by Pusey of Chicago and Coley of New York, in which such astonishingly favorable results occurred in far advanced and inoperable cases, lead us to regard no case as entirely hopeless.

IV.—THE PHYSIOLOGICAL ACTION AND THERAPEUTIC USES OF THE X-RAY.

BY C. M. MUTZ, M.D.,

DOUGLASS, KANS.

I wish frankly to state at the outset that I do not think I can present a paper *eminently* worthy of your attention.

I am even conscious of the meager respect my efforts to address superiors on the weighty subject I essay may deserve, especially since it is true that all my thoughts and reasonings are based entirely on clinical observation in private

practice, and the use of the X-ray for a period of about two years.

I may, therefore, be classed in some minds with the immature operators, but I shall try to be becomingly modest, and use the interrogation point without stint. Again, I have not advanced to that eminence where I have many winds to shake me, and cannot, therefore, fear being dashed to pieces by any fall I may make in your estimation. But as it is only the pseudo-scientist I could have reason to dread, I need not make myself odious to this body by apology.

The conservative physicians and surgeons may believe themselves justified in a moderate estimation of the therapeutic value of the three general forms of electricity, viz., Faradism, galvanism and the static currents, but I do not think they can wholly suppress their wonder at the marvelous results accompanied by the, as yet, empirical and tentative use of the X-ray.

I have accomplished numerous satisfactory results with it in what may be called minor troubles, although they resisted the efforts to cure of very reputable physicians, by other means; but I have two cures to my credit, backed by such authority in diagnosis and in failures to benefit, as will, I trust, amply justify me in your minds in my efforts to comprehend to the limit of my learning and understanding, the agency by which these results were secured.

James S. Butts, of Beaumont, Kansas, came to me presenting a flattened ovoid tumor extending over the angle of the jaw onto the neck. It was the third recurrence of the growth, it having been pronounced a sarcoma and removed first about four and a half years ago by Dr. Emerson, of Winfield, and about a year afterward by Dr. Senn, who also pronounced it a round-celled sarcoma, and made a very extensive operation for the removal, in which he cut away the superficial branches of the cervical plexus. Within a year the tumor again returned, involving adjacent tissue, and grew rapidly until, when he came to me, ulceration was taking place at the apex.

Ten exposures to the Roentgen ray, twenty-five minutes each, average duration, reduced the tumor one-third and healed the ulcerated surface. Twenty more of the same

kind completely removed it and brought him back to a state of general health. This cure is of about a year's standing, and there are no indications of return.

Geo. S. Hillhouse, of Pierce City, Missouri, came to me about four and a half months ago with a carcinoma presenting a sloughing colloid center. This tumor was situated on the neck, and its center covered the mastoid end of the sterno-mastoid muscle.

The degenerated center was conical, one and one-half inches in depth, and of the same diameter at the base of the cone cavity, or between the margins of the integumental covering surrounding it. This gentleman had his case diagnosed by a number of medical men, whose opinions were in harmony as to the condition. Just before coming to me he was seen by Dr. John W. Perkins, who declined surgical interference and referred the case to Dr. Scott for X-ray treatment. Mr. Hillhouse informed me that he had received sixteen exposures, and he thought with some benefit.

You will understand, from the location and extent of tissue destroyed, something of the patient's general condition. He was sleepless with pain; there was a marked anorexia; cerebral and gastric disturbance from involvement of nerve plexus sending branches to the pneumogastric, speech was difficult, and deglutition all but impossible. I understate rather than overstate the objective symptoms.

I vouschafed no hope to this patient, but gave him a prolonged treatment, and he was taken home. He received such benefit from this one application, however, that he was brought back in two weeks. He improved rapidly for a time, and then retrograded for a season, during the heated term, but advanced again, and is at this writing making progress toward recovery.

Since writing the report of the progress of this last case, Mr. Hillhouse, the patient, returned to his home in Missouri, and died from the effects of hemorrhage, caused by rapid degeneration of the deeper tissues involved and comprising, I judge, a branch of the carotid.

To present two successful cases I have to mention one of less importance, and one no better authenticated than by my own diagnosis, and the patient's self-conviction, who had a very bad cancerous history. An epithelioma of typical honey-comb appearance, existing four years, and resisting all means employed to cure it—but not surgically dealt with—cured on the person of Richard Reed, Douglas, Kansas, two

years ago. I first treated this case, however, by galvanic mercuric diffusion, or mercuric oxychloride cataphoresis; but the X-ray was more prompt in the regeneration of normal tissue.

I am not intending to make a clinical report of these cases and their treatment, but merely to refer to them as a stimulus to my inspiration for study of the material physiological laws governing the agent so kindly favoring my use of it. I know that equally remarkable results have been accomplished by others the country over, but only my own achievement could serve to brace me to so much boldness.

To begin at the beginning, we may broadly state that the Roentgen or X-ray is the result of both potential and kinetio-electric energy; but whence comes this force of mightly potential, that stirs the kinetic energy within the tube, vibrating the ether to the extent of producing the light permeating opaque substance? A few sparks, awakened by friction and caught up by a paper element on a stationary plate, in a static machine, inducing a reciprocal charge on a revolving plate and increasing to enormous potential by reaction effects, and we have it! But this is only a method of calling a sleeping force into action.

Where does it slumber? Where do the antagonistic elements of its nature, necessary to the expression of force, equilibrate and rest innoxious? "We now are in so deep that should we wade no more, returning were as tedious as to go o'er," so we venture on. Electric energy is said to exist everywhere and in everything, but has it been found to exist in ponderable matter without polarization of the molecule? In ponderable matter does it not evidence its presence by disintegration, molecular decay, or the chemic decomposition of electrolysis? Has it been demonstrated that ether and electricity are not co-efficient—that they are not co-essential and co-existent? For our own cogitations we have defined electricity as a capable force in nature equilibrating and at rest in the atom of ether. But it may be objected that ether is not atomic—that it is an absolutely continuous, imponderable substance, impossible of atomic

conception. But we are not instructed that an atom of matter is not simple but compound; that it is composed of hundreds of similar parts which may be separately dealt with from the rest of the atom and each fragment electrically and ionically charged? Is it not necessary to have a limitless base of supply for this force, from a universally permeable substance, in which it is at rest, to account for its phenomena? We think it necessary to conceive of ether as matter. We do not feel the least inclination to conceive of light as matter, because we recognize at once that it is a process going on in substance, yet light may be shown to have two portions the exact opposite of each other, which may be divided by certain arrangements, and again united to annihilate each other.

Now as to the light of the Crooks' tube, what is the process going on within the exhausted tube to give us the light illuminating opaque substance, and yielding the physiological action and therapeutic uses the ray gives us? What have we within the tube? An elastic substance, capable of stress and motion, but not a conductor or director of electric currents. In the method of genesis of the X-ray, we separate metallic conductors within this substance, which in atmospheric media would be but a spark gap, and turn onto them respectively, positive and negative currents of tremendous electromotive force, but infinitesimal quality.

Now, in the true sense there is no passing of the current from one electrode to the other, because ether will not conduct or direct electricity, but they are both thrown into the tube and mix up with the substance in some way to produce the unaccountable penetrating ray; not only mixes up with it to produce it, but becomes a necessary part of its existence beyond the tube. No one, I suppose, presumes to deny the negative polarization of the atoms and molecules of the ponderable matter through which the ray passes; it is too easy of demonstration. Now, it is accepted that this light is matter, or substance? I have heard it stated that Sir William Crooks regarded it as consisting of matter in a fourth state. We have seen that ordinary light is not sub-

stance, but a process operating in substance. Shall we be content to say that X-ray light is something not material, a new kind of radiation concerning which the finite or ordinary mind has no business to inquire?

Pardon us for believing otherwise on this latter proposition. Then to inquire further: Is the ray produced by negative ions thrown off from the cathode exciting hypervibration of etherial waves? I have known of this theory being advanced, but if this were so, would not negative ions demonstrate these same light producing qualities in other situations? And would not energy so devoted be frittered away by irregular vibration? Again, are not ions the product of electrolytic action on matter? And can appreciable electrolysis be accomplished with a current of infinitesmal quantity? The following theory may not be worthy of consideration, but we give it: There passes into the tube an excess of negative current. Is it because the cathode is made of better conducting and relinquishing material? This would interrupt the resting equipoise of electric components in the atom of ether and there set up a hypervibration of the enforced negatively polarized atom, which must seek equilibration without the tube. As long as the ether is so influenced it illuminates the substance through which it passes. When equipoise is established, illumination ceases.

If ether were an absolutely continuous medium impossible to affect in part or atomically, would not the vibration necessary to produce the X-ray light reach a hundred feet, a thousand feet, or an incalculable distance from the tube, But it is recognized as an electrically influenced radiation, and distinguished by the name cathode ray, and as such we consider its physiological action.

So far as we have learned, there is little evidence that actinism plays any important part in the therapeutic value of the ray. If it did so, would not the arc light, concentrated by lenses or reflected by mirrors, be of as great value, or even greater, in surface condition at least? The activities of the arc light, it is said, include the violet, ultra violet and many others which take part in photographic action.

The X-ray's value, then, must be due especially to that quality which designates it as the cathode ray. It is the effect of negative electricity applied in a new way by which it influences metabolism to a greater extent in some respects than by any way in which it has been applied heretofore.

What then do we regard as its highest physiological effect? It is a diffusible general stimulant of the highest type, and a transcendent one to the tissues through which it passes, promoting the destruction of micro-organisms and inimical cells by increased phagocytic influence, protoplasm which has lost the influence of nervous control producing injurious cells which are destroyed in like manner. I have seen an authoritative opinion broadly state that "the X-ray contracts protoplasm." I assume that this means all protoplasm, but have discerned no results which lead me to believe this is true. Protoplasm of fungoid growth—protoplasm with vaculoes may be contracted, but does it have a contracting effect on physiological protoplasm?

It may be directly destructive of some non-animal micro-organism, but I cannot believe it a universal germicide. Certainly it is not an insecticide. It will not kill the chigger or leptus irritans, a special pest of my resident locality. I am led to believe that its germicidal powers are limited, from the fact that I have found eczemas and prurites and other surface affections which, in my opinion, did not depend on specific micro-organism, were more amenable to the X-ray treatment than were those which I thought did.

It seems to be destructive in some way of certain streptococci and to favor the development of certain staphylococci of pyogenic variety, as it quickly changes the acrid and offensive serous discharge of phagedenic ulcers to a laudable secretion of alkaline reaction. Is this phagocytic action? It has been claimed by some that the ray has an analgesic property. This I have not found pronounced.

It has not relieved the pain of sciatica or other neuritis in my hands, but it soothes the irritated nerve centers, by stimulation, I think, to the point of somnolence. We have been told that the X-ray is a "giant in chains," and those

who have the temerity to unchain it have been given fair warning. To "make haste slowly" is a good precept in all important procedures, but I have seen no greater reason for caution in the use of the X-ray than is necessary in the use of the sound, and I doubt if more harm will be done with it by the tyro.

Regarding the technic of application, I do not believe there can be harmony of opinion except in a general way, for the reason that exactness is impossible on account of varying constitutional conditions. Regarding the X-ray burn, which some say is necessary for therapeutic effect, and others that it is not only unnecessary, but most undesirable, I have to conclude that it is sometimes necessary and sometimes not.

The measure of a tube to burn is not a measure of its curative power, but if your exposures are inefficient without dermatitis, it will be necessary to proceed to this extent, and following this objective evidence of its activity, you may get the effects desired.

Respecting X-ray cataphoresis, I would not deign to notice the subject at all, were it not that I have encountered in my journal reading some very learned advocates of the feasibility of the procedure, because it seems to me that the *irrazionale* of the idea should be patent to anyone. Cataphoresis is the anodal diffusion of medicinal substance to deep-seated tissue, or if we wish to give it a broader definition and say that it is medicinal substance carried by molecules accompanying electric curents, we still have no foundation for the supposition that molecules will convey substance which seeks the anode, along with the ray! Notwithstanding I have experimented with cocaine and other solutions, but have been unable to discover any results indicative of penetration. The discutient effects, nearly always observed in non-cachetic indurations, is not more marked, I think, than by the application of the galvanic cathode. But I have a last averment to make, and I make it indubitably, which is this: that the X-ray will be found beneficial in all local pathological conditions of a chronic or subacute variety, where stimulation of reconstructive metabolism is desired.

THE X-RAY TREATMENT OF CANCER.

DISCUSSION OF PAPERS BY DRS. WALKER, JICINSKY, BROWN AND MUTZ.

DR. EMERSON M. SUTTON, Peoria, Ill.—I want to discuss only Dr. Brown's paper a little. I have been working in that line somewhat for about a year, and as he suggests we ought to give our experiences in this new therapy. The cases I have had under observation tally with those reported. Cancer of the tongue is better treated surgically and afterwards with the X-ray, for the reason that the base of the tongue cannot be reached successfully with the ray. A thorough radical operation with subsequent X-ray treatment is far better. We all know the danger of operating and not operating wide of the cancerous growth. I want to object to such methods, for the reason that the cells are set loose from the tissue. I believe from the cases reported that the time would have been shortened if surgical treatment had been instituted and then followed with the X-ray. It is a plan that I have adopted with old people who are unable to make the trips to the office, to do the radical operation and treat with the X-ray. One case treated in this way has shown no signs of recurrence. One case of cancer of the breast, operated upon in 1889, has a history of freedom from recurrence for ten years. At the end of that time there was a recurrence and the growth was again removed, going down to the periosteum of the rib. The base was cauterized and the operation was successful, but in a short time there was a recurrence, and then the X-ray was instituted. An X-ray burn resulted, which refuses to heal, and the mammæ are still swollen, but Dr. Ochsner, who has also had the case under observation, said the burn was a good thing—that the patient would have been dead long ago if this had not occurred.

DR. JOS. RILUS EASTMAN, Indianapolis.—Listening to such disquisitions as we have heard tonight one might easily imagine oneself in the very fairyland of science, yet certain statements made in some of the papers impress me as being rather bizarre. Dr. Rudis-Jicinsky said that if we are not successful in treating malignant growths with the X-ray, we should subject them to surgical measures. I would like to ask whether it is not always better to subject them first to surgical measures if it be still practicable. Many cases, of course, are amenable to treatment by surgery. Are we to give over carcinoma to the X-ray treatment, or keep it in the domain of surgery except where inoperable?

Dr. Brown made the statement that it might be safe to

remove the skin in order to allow the ray better access to the parts. This would increase the ulceration and destruction of underlying tissues. I think it would be wrong not to remove any carcinoma that is amenable to surgery. The best men have come to the conclusion that only inoperable cases should be turned over to X-ray treatment. This is Finsen's position. I have knowledge of a case of lip carcinoma that was treated by the X-ray from the beginning, when it was readily amenable to the knife with assurance of complete cure. The patient, a lady, continued treatment with the X-ray quite unsuccessfully, and now is beyond surgical hope. I ask for information and I would like to know whether these gentlemen who have read take the position that even in superficial carcinoma the X-ray should be used before the knife.

I have had an experience in the X-ray treatment of a neoplasm very much like Dr. Pusey's, in a case recently reported by him, in which exposures were made without apparent benefit. The case went away and after six months came back to Pusey showing great improvement. I have in my charge a young man with sarcoma of the inferior maxilla. He refused to permit the jaw bone to be removed, and I gave him exposures with the X-ray about five or six times a week with a high vacuum tube about two inches from the globe, each exposure continuing about ten minutes. He was under treatment about three weeks. He went home and at the time of his departure, so far as I was able to determine, there was no benefit. After six weeks his physician wrote me that the tumor, which was as large as a hen's egg at the time of the first treatment, had very materially reduced in size until it was no larger than a quail's egg. I mention this to emphasize that the X-ray seems to have an effect continuous after the exposure.

Dr. Walker, in closing.—I aimed to impart simply what we know at this time. I think Dr. Eastman's position is well taken, except in the exposure of the growths. In all operable cases, we should treat with the knife first. It is very interesting to speculate as to the action of these rays, but at present so little is known, even by scientists, that it is not worth while to go into it at this time.

Dr. Rudis-Jicinsky, in closing.—I think I have seen one case which demonstrates when the ray should be used and when not used. A patient was brought to the Post-Graduate School clinic said to have an ulcer of the stomach. I was

asked to make an examination and I could not find signs of an ulcer of the stomach; there was simply a dilatation of the stomach, which had been treated by the X-ray. That is the point; if we don't know what we are treating, or if we are to treat corns, etc., with the X-ray, I have nothing to say. But there is one thing sure, that the X-ray, in combination with the knife, has a future. But individuals who do not know what they are treating, or how to treat the cases, they had better let them alone, as they will do more harm than good.

Dr. Brown, in closing.—In regard to the distance of the tube, that is a technicality which varies with different workers in X-ray work. When we consider that some workers put the tube in contact with the growth, and that this has its advantages, hence it is much easier to say that the tube is in contact or is such a distance away.

We all meet with cases of carcinoma of the breast in women who suffer in silence for years without saying anything about it. I saw a woman die from this disease when I was the only person beside herself who knew about it. She died the next day after I saw her.

I differ with Dr. Eastman in regard to superficial growths of the face, especially about the eyelids, alæ of the nose and the lips. We all know too well of the cases of epithelioma of the lower lid when removed by a plastic operation may have the nasal duct destroyed and a constant overflow of tears result. And we know very well, too, that the X-ray will take an epithelioma from the lower lid and from the face and leave scarcely any destruction of tissue and without the impaired cosmetic effect, leaving good functional use afterwards. In regard to deep-seated carcinomatous growths, I have not yet seen any worker who says they can be cured. There are, however, a great many cases, especially where the growth is on the anterior wall of the stomach, in which the patient increases in weight. Dr. Favill, of Chicago, told me only a week ago that a patient he had seen with superficial carcinoma of the stomach had gained twelve pounds.

V.—THROUGH-AND-THROUGH INTESTINAL SUTURE, WITH REPORT OF ADDITIONAL CASES.

BY F. GREGORY CONNELL, M. D.,

LEADVILLE, COLO.

In reviewing the literature of intestinal surgery, it will be found that the suture has passed through the following phases or progressive steps:

1. The suture including all coats, with the knot on the serosa, in the peritoneal cavity.
2. The suture including the peritoneum only.
3. The suture including the peritoneum and the muscularis.
4. The suture including the peritoneum and the muscularis, and penetrating, but not perforating, the submucosa.
5. The suture including all coats, with the knot on the mucosa, in the lumen.

History repeating itself, as we see, with the oldest and the newest methods similar, in that in each the suture includes all the different layers of the intestinal wall, the difference being that in the first the knot is located on the serosa, while in the last the knot is placed upon the mucosa.

Whether the pendulum shall make the complete swing and return to its original position, we do not presume to say; such a method has been recommended, and may in the future become a recognized procedure.

At the present time, the point which appears to be the most attractive is whether to perforate or not to perforate, all coats of the bowel wall. That this is the trend of thought at the beginning of the twentieth century, is unmistakably evidenced by the following quotations:

N. SENN.—"Any surgeon who hastily transfixes the bowel with a needle from thirty to forty times in applying the Lembert suture, is liable to perforate the whole thickness of the bowel, once or more, and the puncture may become the seat of a perforation and the direct cause of a fatal peritonitis."

O. H. ALLLIS.—"The rule that the serous coat must only

be pierced is no longer entertained, and the operator will act wisely if he penetrates the thickness of the intestinal wall."

EDW. MARTIN.—"In regard to all intestinal sutures, it seems clear that the dread of penetrating the mucosa is one of the legacies left from preantiseptic days. The peritoneum will stand a great deal of insult if it is not soiled, and it will stand some soiling if it is not insulted, but the combination is deadly. If there be infection carried by the thread traversing the mucous membrane there are few records to prove it. If the sutures are properly applied, some of them are almost certain to penetrate some part of the mucous membrane."

CHAS. N. DOWD.—"Can we put our sutures through the entire intestinal wall in order to gain this firm support? This seems, to me, to be the most important question concerning intestinal sutures at the present time, and the answer should be, 'Yes.'"

While the through and through suture was brought to the attention of the profession by Maunsell, and emphasized by Wiggin, who was the first to repeat the method of Maunsell in America, he was not a pioneer in this particular phase of intestinal surgery, being antedated by Bishop in 1885, and by Vesein in 1871. (Not to mention the old and obsolete methods, such as Glover's and similar ones, which were utilized before the Lembert principle of sero-serous apposition had been advanced.)

Bishop described and employed a perforating intestinal suture in his so-called "Continuous Interupted" stitch, which, like all others of this variety, not excluding Maunsell's and its many modifications, presents a weak spot which necessitates secondary or retaining stitches.

Vesein utilized a suture which passed through all the layers of the intestinal wall, but was secured by merely a double twist of the thread ends, instead of by their being tied in a knot.

The through and through suture, knotted on the outside, on the serosa, without retaining stitches, was presented in September, 1892, by M. E. Connell, with experiments that seemed to be entirely satisfactory. (This method differing from the old methods of perforating stitches, knotted on the serosa, in that sero-serous apposition takes the place of the

attempt to unite the histological elements layer for layer, as in the older.)

In the literature, three cases are to be found in which it has been employed upon the human being, with perfect recovery of the patients in each instance. But despite this favorable outcome, after the use of this method of suture, both experimentally upon the lower animals, and in actual experience upon the human being, it is acknowledged by the majority of authorities that the safest place for the knot, in perforating stitches, is within the lumen of the bowel. It may be regarded as axiomatic that the location for the knot of an intentional perforating stitch is outside of the peritoneal cavity—in the lumen of the intestine.

The term "intentional" is here used advisedly; it must necessarily follow that in an *un*-intentional perforating suture the knot ought to be similarly located, i. e., in the lumen.

If these two statements are true (and it has been shown that a great majority of intentional non-perforating sutures are, in reality, un-intentional perforating sutures), then the desirable situation for the knot, in practically *all* intestional suture, is *in the lumen* of the gut.

In the comparatively primitive methods of Bishop and Vesein an attempt is made to place the knot upon the mucosa. In the former the knot is tied in the line of union and then *pushed* into the lumen, a very unsafe procedure, and one which necessitates the introduction of one or more re-enforcing stitches. And the principle of which is to be found resurrected by Dowd in the Annals of Surgery for July, 1902.

In the latter, the attempt is made, but as a result the security of the union rests upon a double twist of the threads instead of a firm and secure knot.

The method of Maunsell is an improvement upon the earlier attempts, in that *all* of the stitches, at the site of the enterorrhaphy, are securely knotted in the lumen. In order to do this, a complicated invagination is necessary, and as a result a longitudinal incision at the convex border must be closed with sutures that include but a part of the entire wall, and are tied upon the serosa. This method of Maunsell has

been used quite extensively and with almost uniform success. (In 1899, we were able to collect twenty-nine cases from the literature.)

And as is usual with successful procedures, has been modified by many investigators, notably by Cheatle, Hartigan, Ullman and Wiggin.

Cheatle and Hartigan, each independently of the other, placed the second incision closer to the line of union, in fact, making it continuous at the convex border, with the circular incision. In this manner doing away with the objectionable invagination.

Cheatle afterward suggested that this longitudinal incision be closed transversely to the long axis of the bowel, a la Heinecke-Mickulicz, and so reduce the danger of stenosis.

Ullman, after invaginating, as does Maunsell, instead of suturing the cut ends, inserted a hollow cylinder of carrot and tied a circular ligature around the carrot and the two invaginated ends. The invagination was then reduced and the secondary incision closed with Lembert's.

Each of these methods are modifications, as claimed by their originators (improvements or not), in which the principle of the original method is retained and utilized.

The essential and characteristic feature of the Maunsell procedure is a complete line of through and through stitches, knotted in the lumen, at the site of the enterorrhaphy and at a more or less distant point, an incision by means of which it was possible to so place the stitches, with the closure of this second incision by Lembert's.

In December, 1898, Dr. Frdk. Holme Wiggin, of New York, presented what was termed a "modification" of the Maunsell method, in which all but the last few stitches of the enterorrhaphy are closed with perforating stitches, such as Maunsell recommended, through and through circular stitches, tied in the lumen directly over the seam of the union. As it was deemed impossible to securely place the knots of these last few stitches in the lumen, without resorting to the second incision, the operation was concluded by utilizing Lembert's for this part. This method will be found to differ radically

from that of Maunsell in that the line of union is but *partially* united by perforating stitches.

The completeness, throughness and security, at the site of the union, for which Maunsell was willing to go through the difficult procedure of invaginations, followed by the closure of the second incision, are entirely disregarded in the Wiggin modification. It was evidently in an effort to do away with just such weak spots that Maunsell devised his operation. Had it been considered advisable to introduce through and through sutures but a part of the way around the circumference of the bowel, it is not likely that he would have made his second incision and invagination.

The fundamental principle of the Maunsell method is: perforating sutures tied in the lumen, through the *entire* line of union. Any method which does not conform with the fundamental principle can hardly be consistently classed as a modification.

Oscar H. Allis, in 1902, strongly advocates the suturing of the entire thickness of the gut wall in intestinal anastomosis. His method is similar to that of Dr. Wiggin in that the last few stitches are inserted from the serous aspect of the bowel, and are consequently knotted on the outside of the bowel wall. But it is strikingly different, in that these last few stitches, or the last stitch, is not a Lembert, but instead deliberately includes all the different layers of the intestinal wall, and is then knotted upon the serosa, the same as M. E. Connell advocated in 1892.

Dr. Allis states that, "It does not matter what stitch is used, the whip stitch, through and through stitch, or over and over. All that is essential is that the approximated bowel should be securely united." To which might be added, as an essential qualification, that these approximated bowel ends should remain securely united till union is firmly established. With the "over and over" stitch there is a condition quite similar to that resulting after the introduction of the Manusell or circular stitch, i. e., two cut ends confined within a circular ligature, and as a result, the slipping of one cut end by the other; and in this manner giving rise to a sero-mucous

apposition, not only a possibility, but at the same time a probability. The perforating suture has been employed, not only in simple enterorrhaphy, as we have seen, but also with the use of artificial aids in suturing. Such a suture was used with the "bone-plate," and is today employed with the Murphy button. In both of these methods and their many modifications the through and through suture is tied upon the serosa. Thus at first sight appearing to be contrary to and axiom regarding the location of the knot in stitches of this character, but on second thought this marked difference will be found between such sutures when employed alone and when with a foreign body. In the latter instance, the knot, while on the peritoneal surface, is shut off from the general cavity by the serous apposition external to the knot, caused by the areas of the serosa brought into contact by the foreign bodies. While in the former instance the knot is in the free peritoneal cavity, and not excluded by any adhesion of the serosa external to it.

In Breitenbach's suture a similar condition is to be found, the knot on the serosa, but the direction of the stitch places the knot toward the cut margins, and thus it is excluded, more or less completely, from the free peritoneal cavity by the apposed serosa.

A very pertinent question, at this time, might be put thus: Why should we employ a through and through suture in preference to a suture that penetrates but a portion of the entire thickness of the intestinal wall?

Since the days of Lembert it has been handed down as an iron-clad rule that any stitch involving the serosa must not include the mucosa. But that this rule was being constantly broken, either consciously or unconsciously, no one can doubt, for as early as 1887 Senn says: "Any surgeon who hastily transfixes the bowel with a needle, from thirty to forty times, in applying the Lembert suture, is liable to perforate the whole thickness of its wall once or more, and the puncture may become the seat of a perforation, and the direct cause of a fatal peritonitis."

But this same rule of Lembert is to be found in force and

emphasized as late as 1891 by Halsted, of Baltimore, in his article which calls attention to the clinical importance of the submucous layer of the intestinal wall. The fact that the submucosa is strong and resisting and capable of securely holding a stitch when once inserted, and that the other layers are of little value in this respect, is of the utmost importance in intestinal surgery, the credit of which adds another to the many laurels of that great teacher and surgeon, Samuel D. Gross.

Although the work of Gross upon this point is so complete and perfect that nothing has been added to it up to the present time, and was completed and published in 1843, it did not attract any attention until Halsted, in 1891, presented his work, which was, in effect, a repetition of that done by Gross. For some reason, possibly because the profession was unprepared for such an advance at that early date, the work of Halsted was proclaimed as an epoch-making event; while the previous work of Gross, similar as far as this important procedure goes, and which emphasized this particular phase of the intestinal suture, has been disregarded, or rather lost sight of, only to reappear at a later date with greater brilliancy.

The works of Gross and Halsted, as regards the submucosa, differ in this one particular: Gross says, "It is the membrane THROUGH which the surgeon should always carry his needle in sewing up wounds of the intestine." He evidently realized the comparative thinness of this layer. Halsted, on the other hand, failing to consider the comparative sizes of this layer and the ordinary intestinal needle, states that the suture must "Penetrate but not perforate" the submucous layer.

The writer has shown (J. A. M. A., Oct. 12, 1902), that the usual intestinal needle is approximately six times as large in diameter as the thickness of the inelastic human submucosa; and rendering such a procedure as "penetration without perforation" an impossibility, at least practically impossible for the surgeon of average training and manual dexterity.

In order to emphasize this point, we will take the liberty to paraphrase a few lines written by the immortal Abraham Lincoln, viz:

SOME surgeons may claim to split the submucosa ALL of the time, and ALL surgeons may claim to split the submucosa SOME of the time, but ALL surgeons cannot claim to split the submucosa ALL of the time.

With this splitting of the submucosa out of the question, we must choose between two evils, i. e., the danger of not including the submucosa with yielding, as a result on the one hand, and the real or hypothetical danger of perforating into the lumen, with capilliarity, as a result on the other hand, To effectually do away with both of these dangers, the through and through suture, knotted in the lumen, is recommended.

Through and through.—To prevent the possibility of not including the submucosa and thus absolutely excluding the yielding of stitches. This element of danger (yielding), according to Rosenthal, is the cause of the peritonitis in 50 per cent of the cases which terminate fatally, and in speaking of which Edw. Martin says, "Cases of fatal peritonitis are not due to penetration of the mucous coat, but to failure to include the submucosa."

Knotted in the Lumen.—In order to diminish, if not exclude, the danger of leakage. In a suture that penetrates all the layers of the intestinal wall with the knot on the serosa, the probalility of leakage occurring is considerably greater than is this same danger when the knot is upon the mucosa, within the bowel. Chlumski states that in all cases of union, by suture alone, in which leakage occurred, the seat of the leakage was at the site of the knot. Had the knot been within the lumen this leakage would, in all probability, not have taken place, for under such circumstances the knot as well as the entire suture would have been excluded from the free peritoneal cavity. Or as Dr. Ferguson expressed it, "The possibility of leakage minimized, inasmuch as all coats of the bowel are included in its grasp. The mucosa is friable and the knot sinks into the submucosa. The suture is also

buried from the peritoneal aspect, when it is tied. All the knots being on the internal surface of the bowel, it takes but little sero-serous lymph to seal up the peritoneal surface and any drainage that takes place along the suture from the mucosa toward the peritoneum will at once be returned, by capillary attraction, to the inside of the bowel again."

These two advantages: First, less danger of yielding or tearing; second, less danger of leakage, even though yielding or tearing does not occur. While constituting the chief and foremost reasons for utilizing the perforating suture, these are not the only advantages to be derived by employing them. Others of no inconsiderable importance are: Third, smaller diaphragm; fourth, adhesions diminished; fifth, less danger of necrosis; sixth, no foreign body; seventh, decrease in time.

(3) In every method of suture which adheres to the Lembert principle, i. e., sero-serous apposition, a diaphragm, large or small, will invariably be formed, the size of which depending upon the method of union employed and the care with which the technique has been carried out.

In a method requiring two or more rows of sutures, the lumen will, of necessity, be encroached upon to a greater extent than it will if but one row of sutures are employed.

Dowd credits Ballance and Edwards with saying that the Maunsell, re-enforced by the Lembert suture, gave practically no diaphragm. This is directly opposite to the result of the writer's experiments, and also contrary to the statement made by these same gentlemen in the *Med. Chir. Trans.*, 1896, in which they say that while performing post-mortems, after doing the Maunsell operation, that the circular line of union was often located only with the greatest difficulty, owing to the fact that there was visible practically no diaphragm, while the location of the longitudinal incision, which was closed with Lembert's, was plainly visible and marked by a prominent ridge.

In the *Annals of Surgery* for June, 1902, Martin, of Philadelphia, cites an experiment, as follows: "In one dog subjected to an end-to-end suture by the Connell suture, and

lower down to a similar procedure by the O'Hara forceps, some hard feces which passed through the upper line of junction lodged in the lower and produced an obstruction."

This possible source of failure and danger is spoken of by Senn in the following terms: "If, in applying the Czerny-Lembert suture, more than a few lines of the margin of the bowel is inverted between the two rows of the sutures, there is great danger of causing primary traumatic stenosis by the projecting circular ring in the lumen of the bowel."

Murphy has shown that a broad serous approximation is not necessary, that a line of approximation is as good as half an inch, so it is not advisable to include too large a portion of the gut wall in the bite of the stitch; the smaller the bite, the smaller the diaphragm will be.

Dr. Bartlett says, "The lumen in my five-day specimen was far too narrow, a result of the peritoneal sutures being placed too far from the free end of the gut, and of too much tissue being inverted in consequence. The remedy for this is apparent."

(4) The knot and free ends upon the serosa are prolific causes of the formation of adhesions, which are followed by their characteristic disagreeable, if not dangerous, symptoms. Adhesions are caused by raw (denuded of endothelium) surfaces or foreign bodies within the peritoneal cavity.

By placing the knot and ends within the lumen, outside of the peritoneal cavity, the chances that these objectionable adhesions will form are materially decreased. To show that the importance of these adhesions is not exaggerated, we refer to Halsted, who says: "The success of any form of intestinal suture is inversely proportionate to the extent of the adhesions which result from the employment of the particular method."

(5) The possibility of the inverted margin of the cut ends being shut off from their blood-supply, and in consequence becoming gangrenous, has been pointed out by many, especially by Maunsell and Senn; the former stating, "A double line of sutures should never be applied in intestinal surgery; it obstructs the circulation too much, and interferes with firm

plastic peritonitis, and in some cases causing gangrene of the inverted portion of the gut." And the latter in the statement, "That the second row of sutures in the Czerny-Lembert has often been the cause of gangrene of the inverted margin of the bowel, would not be difficult to prove by many post-mortem records." By utilizing but one row of sutures this danger of necrosis of the inverted margins of the cut ends can be eliminated.

(6) A perforating suture will invariably pass away into the lumen of the canal, and be eliminated with the feces, A Lembert suture will become encysted, remaining as a foreign body, or slowly work its way through the wall into the canal, and then away with the fecal current.

If it does escape into the alimentary canal, it will occupy a much longer time than will the stitch that includes the entire intestinal wall.

Dr. Bartlett (*Med. Bul.,* Wash. Univ., April, 1902), presented a specimen in which all of the interrupted sutures but one had passed away within the first sixteen days. In the writer's experiments, in a twenty-one-day specimen, the continuous suture was found in the lumen, entirely separated from the site of the union.

In our experiments, we have found that a through and through suture will invariably pass away and much sooner than will the Lembert suture. In the perforating suture, with the knot placed on the mucous membrane, there is no burrowing of the bulky part of the stitch through the tissues, to induce an irritation which may be followed by an inflammation that may extend beyond the safety line.

The final outcome, after the employment of a stitch of this character, is a clean adhesion of the serosa, leaving a union in which there is no foreign body of any description, not even a buried stitch.

(7) By using but one row of stitches, instead of two or more, the time of the operation is materially decreased; as is likewise done by employing the square stitch, or what has been termed the "Side-knot" stitch, instead of the circular

or "Top-knot" stitch of Maunsell, as it decreases by one-half the number of knots to be tied.

The technique of introducing and tying the last stitch will occupy but a minute, after a very little practice. Regarding this technique, we take the liberty to quote from DeForrest Willard, who, in speaking of this method, says, "And was struck with its simplicity and with the rapidity of the operation," and from Alex. Hugh Ferguson, "The technique of the operation can be readily picked up by once performing the operation upon the dog or cadaver," and the writer might add, even upon the finger of a glove.

In speaking of the tying of the last knot in this method, Dr. Wiggin, in a recent article, says: "It would appear to be necessary, after separating the united tissues, by passing the needle from the outside of the bowel into the lumen between them, to bring them into close approximation again, by means of a Lembert suture, otherwise leakage of the intestinal contents might occur at this point." This is, as stated above, merely an appearance.

The use of the words "united tissues" might be misleading, as no union exists at this time; the two walls are merely held in serous apposition by means of the stitches already inserted, and the needle is simply allowed to pass between them. No such leakage has occurred in a very extensive experience upon dogs, dating from October, 1898, when it was first accomplished by the writer, nor has leakage at this or any other point been noted in any of the cases in which this method has been employed upon the human being.

Upon a careful examination of the bowel walls at this point, we find that the cut ends are inverted, forming a diaphragm, with perfect serous apposition. Here, then, is found all that is essential for a rapid and firm union, i. e., sero-serous apposition, and at the same time, all that is necessary to prevent leakage, i. e., the diaphragm with its valve-like action.

This diaphragm acts like a valve, and is of the greatest value in preventing leakage, and possibly of even greater importance than the serous apposition. Pressure from within

the lumen will cause the two inverted ends, which constitute the diaphragm, to be forced more closely together.

It is this fact, the same in principle as in the prevention of the regurgitation of urine from the bladder into the ureter, that will, and does, prevent leakage of the intestinal contents, after enterorrhaphy.

The greater the force from within, the stitches not yielding, the closer will the opposite cut ends be held together, and the smaller will be the likelihood of the contents escaping.

Leakage is practically excluded, and none the less so at the point where the needle was passed and the knot tied than at any other place for the serous apposition and the diaphragm at this point was interfered with for a moment, and that moment before any attempt at histological repair had been made by Nature, and as soon as the knot slips back into the lumen the same serous apposition and diaphragm obtains as before.

It is a well-known fact that, in each and every suturing of the bowel, regardless of the method employed, contamination of the serosa is unavoidable, but this is readily counteracted by flushing the area of suture with normal salt solution, or the Glycozone, which has been so very highly recommended.

Supposing, then, that some infective material, small in amount as it must be, is carried to the serosa in tying the knot, this from the view-point of Edw. Martin, may be regarded as but a very little additional soiling to that already brought there in performing the enterorrhaphy proper, and no "insult" to the peritoneum.

In speaking of the square or side-knot stitch, and the method of tying the last knot, thereby allowing all stitches to be through and through, he says: "These changes, in detail, are in the writer's opinion, of no practical import." The square or side-knot stitch should not be disregarded, as it is a great improvement over the circular or top-knot stitch of Maunsell, and makes the use of a secondary or retaining stitch unnecessary, which is considered by most all to be essential, when the latter is employed.

With the circular or top-knot stitch, the two inverted cut

ends lie within the circle formed by the suture thread.

And with an aggravation of this unequal pressure, as might be caused by gaseous distention, or by a mass of fecal matter, an exaggeration of the condition may result, which may cause an eversion instead of an inversion of one cut end, thus giving rise to a sero-mucous instead of a sero-serous apposition, with a very great danger of peritonitis or the establishment of a fecal fistula as an outcome.

Such an occurrence as the ends slipping by one another is an absolute impossibility when the square or side-knot stitch is employed.

Another reason for using this form of stitch, in preference to the circular, is that by so doing the number of knots to be tied is reduced one-half, and the time of the operation materially decreased.

The location of the knot in these two varieties of stitches, while similar in being within the lumen, are different, in that, in the circular, it is situated directly over the line of the union, while in the square it is to be found at one side of the seam, out of the way. Regarding this particular form of stitch, Bartlett may be quoted, as follows: "I had a leak at the mesenteric insertion, in an end-to-end anastomosis where the union depended upon peritoneal sutures. This is not likely to occur (and in my experience did not), when the first suture is a square one, through and through, as in the Connell method."

And if it is, as has been said, "of no practical import," to make the last one or two stitches through and through and knotted in the lumen, why not leave three or four, or four or five, to be closed with Lembert's, or, as a matter of convenience, why not exclude the perforating stitch entirely and utilize the Lembert throughout the entire union, if it is a matter "of no practical import"?

But is it not a fact, that the through and through suture is better and safer than any stitch that aims to include but a portion of the intestinal wall? That the Lembert suture is not satisfactory is shown by the many operators who have substituted a perforating stitch for it.

Then, as a chain is no stronger than its weakest link, we find an enterorrhaphy in which the last stitches are Lembert's no stronger than the Lembert stitch. To concisely sum up, we may, therefore, state, in the form of a syllogysm:

If twelve Lembert sutures are BAD,

And ten perforating and two Lembert sutures are BETTER,

Then twelve perforating sutures are BEST.

As to the technique, we shall but briefly describe, with the aid of drawings, the more important points of the procedure.

The method of tying the final knot within the lumen upon the mucosa, and the square or side-knot stitch, these two details are probably the only, or at least the most important, innovations.

As stated on previous occasions, either the interruption or the continuous suture may be employed, the choice depending upon the teaching or the experience the operator has had.

This method may be applied equally well in circular enterorrhaphy, lateral enterorrhaphy, pylorectomy, pyloroplasty, gastro-enterostomy, and in incised wounds of the intestines or stomach. In fact, under any conditions where the ordinary intestinal suture may be employed.

In using the interrupted suture, the first stitch should be taken at the mesenteric attachment.

This stitch is of the greatest importance, on account of the separation of the serous covering of the bowel at this point, and great care should be exercised in securing a perfect serous apposition at this point.

In order to do this in the most satisfactory manner, a stitch should be introduced as follows: The needle is made to enter the bowel wall of one cut end, from the lumen, perforate all coats and pass through the serosa of one side of the triangular space formed by the separation of the serous coats.

Then on over and through the serosa of the opposite cut end, at the same relative point, side of the triangular space, then on through the wall into the lumen. This completes

one-half of the stitch and is made with one movement of the needle. The needle is next reversed, and at a distance of about ⅛ inch (3mm.) is made to repeat the steps in the opposite direction, i. e., entering the mucosa of the second cut end, passing through all coats of the bowel wall, including the serosa of the triangular space, and then through the serosa of the triangular space of the first cut end, on through the wall into its lumen, where the needle end and the free end of the suture are tied in a knot on the mucosa.

This stitch, which acts similar to a brad, absolutely secures a perfect serous approximation at this point, which is considered by all to be the most difficult portion of an enterorrhaphy. The remainder of the union is closed by stitches exactly similar to this first stitch. The cut ends are held in proper position, i. e., sero-serous apposition, by any convenient means, such as the Lee holder, the Allis tenaculum forceps, or suspending loops of thread; but the best method, in the writer's experience, is the plan of introducing a stitch, such as are the other stitches, at a conveniently distant point, and leaving the ends of this stitch long, to be held by an assistant, while the intervening stitches are being inserted. This method has the advantage of consuming no additional time, for when the union is completed up to this stitch, and the long ends are of no farther use, they are cut away, leaving the stitch itself in place.

This method, described by the writer in 1891, we are glad to see, has been adopted by Dr. Wiggin, in the description of his method, published in 1892.

With the ends thus held in proper position, the introduction of the stitches is a very simple matter, merely one passage of the needle through all coats of both cut ends, and then at a distance of about ⅛ inch (3mm.), the same process in the opposite direction, and finally the tying of the knot upon the mucosa, at one side of the seam.

This is repeated till all but a small portion of the union is completed. Owing to the fact that it is impossible to place this last portion of the cut ends in the same relative position that we placed the first part, i. e., sero-serous apposition, it is

therefore necessary, in order to introduce the same variety of suture, to proceed somewhat differently.

In order to place the last stitch and knot in exactly the same relative position as the first ones we must proceed in this manner:

The needle enters the gut wall from the lumen, passes through all coats and emerges from the serosa of one side. It is then made to cross over to the opposite wound margin, and entering the serosa, passes through all coats into the lumen of this side. The needle is then turned upon itself and made to retrace its steps at about ⅛ inch (3mm.) distant, passing from the lumen through all coats, emerging from the serosa, then over to the opposite side and entering through the serosa, and finally ending in the lumen of the cut end at which it began.

Now, the two ends of the thread that are to make the knot are side by side, emerging from the mucosa into the lumen, and then extending from the ununited part of the enterorrhaphy out into the free world.

The needle, in introducing this stitch, has passed through the cut ends in exactly the same order as it did when inserting the stitches in the earlier part of the operation, when the cut ends were held in serous apposition, i. e., mucosa, submucosa, muscularis and serosa, then immediately on into the other cut end beginning with the serosa, and then in order, the muscularis, submucosa and the mucosa. This order is then repeated in the opposite direction, ⅛ inch (3mm.) away. The needle end and the free end of the suture now hang side by side from the mucosa, and in order that they may be tied in a firm knot, proceed as follows: At a point in the line of union, about opposite this last and still untied stitch, a threaded needle is inserted, eye first, between two of the previously inserted and tied stitches. The needle is passed between the apposed serous surfaces into the lumen.

By passing the needle still farther onward, it is made to present at the location of the last stitch, where the ends of the suture still protrude, and where the surfaces are, as yet, ununited. By slightly withdrawing the threaded needle, a

loop is formed with its thread, and into this loop are placed the two free ends of the last stitch, which is yet to be tied.

By withdrawing the needle and in its loop the stitch ends, these ends will be made to present, upon the peritoneal aspect of the bowel, on the opposite side between two of the previously inserted and tied stitches, i. e., at the point where the threaded needle was inserted.

Slight traction upon these ends will cause the remaining portion of the line of union to become inverted, and seroserous apposition will obtain entirely around the bowel.

Upon greater traction, the bowel will become flattened, bringing the mucous membrane, upon which the last knot is to be located, into intimate relationship with the line of suture, at the point where the free ends protrude.

The knot is tied with the bowel in this flattened position, thus avoiding the occurrence of any slack.

While still retaining the tension, and the flattened position, the ends of the knot are cut off short, so preventing any long free ends within the lumen. Upon allowing the bowel to assume its normal contour, that of a cylinder, the knot will slip between the already tied stitches into the lumen, and as it is attached to the mucosa of the opposite pole of the diameter of the gut, it goes with that portion of the bowel wall.

By this procedure we complete an enterorrhaphy with all the knots, on the mucosa, but without the secondary incision of Maunsell.

TABULATED LIST OF CASES IN WHICH THIS METHOD HAS BEEN EMPLOYED UPON THE HUMAN BEING.

No.	OPERATOR	INDICATIONS	OPERATION	SUTURE	MATERIAL	RESULT
1	F. H. Martin	Fecal Fistula	Circular Enterorrhaphy	Continuous	Silk	Recovery
2	E. W. Andrews	Stricture of Pylorus	Pyloroplasty	"	"	"
3	" "	Fecal Fistula	Circular Enterorrhaphy	"	"	"
4	" "	Carcinoma of Pylorus	Pylorectomy	"	"	Death
5	Emil Ries	Rent in Rectum	Longitudinal Enterorrhaphy	"	Catgut	Recovery
6	W. E. Schroeder	Gunshot Wound	"	"	Silk	"
7	A. H. Ferguson	Carcinoma of Colon	Circular Enterorrhaphy	Interrupted	"	"
8	F. G. Connell	Fecal Fistula	" "	Continuous	"	"
9	A. H. Ferguson	Carcinoma of Pylorus, Liver and Pancreas	Pylorectomy	Interrupted	"	Death
10	" "	Carcinoma of Pylorus	"	"	"	Recovery
11	E. W. Andrews	Strangulated Hernia	Circular Enterorrhaphy	Continuous	"	Death
12	A. H. Ferguson	Fistula Bimucosa	" "	Interrupted	"	Recovery
13	E. W. Andrews	Stricture of Pylorus	Pyloroplasty	Continuous	"	"
14	W. E. Schroeder	Biliary Fistula	Longitudinal Suture	"	Catgut	"
15	H. O. Walker	Invagination of Ileum	Circular Enterorrhaphy	"	Silk	"
16	A. E. Halstead	Stricture of Pylorus	Pyloroplasty	"	"	"
17	F. G. Connell	Fecal Fistula	Longitudinal Enterorrhaphy	"	"	"
18	W. E. Schroeder	Gunshot Wound	Circular Enterorrhaphy	"	"	"
19	A. H. Ferguson	Carcinoma of Pylorus	Pylorectomy	Interrupted	"	Death
20	Chas. Davison	Tuberculosis of Cecum	Circular Enterorrhaphy	Continuous	"	Recovery
21	D. A. K. Steele	Carcinoma of Cecum	" "	"	"	"

TABULATED LIST OF CASES IN WHICH THIS METHOD HAS BEEN EMPLOYED UPON THE HUMAN BEING.

No.	OPERATOR	INDICATIONS	OPERATION	SUTURE	MATERIAL	RESULT
22	F. G. Connell	Gunshot Wound	Longitudinal Enterorrhaphy	Continuous	Silk	Recovery
23	H. O. Walker	Tuberculosis of Colon	Circular Enterorrhaphy	"	"	"
24	D. A. K. Steele	Tuberculosis of Cecum	" "	"	"	"
25	F. G. Connell	Strangulated Hernia	" "	"	"	Death
26	A. E. Halstead	Int. Obst. Meck. Divert.	Longitudinal Enterorrhaphy	"	"	Recovery
27	E. W. Andrews	Stricture of Pylorus	Gastro Enterostomy	"	"	"
28	F. G. Connell	Fecal Fistula	Longitudinal Enterorrhaphy	"	"	"
29	R. Peterson	Laceration of Gut	Circular Enterorrhaphy	"	"	"
30	E. W. Andrews	Carcinoma of Rectum	" " (Kraske)	"	"	"
31	Edw. Evans.	Strangulated Hernia	Circular Enterorrhaphy	"	"	"
32	Chas. Davison	" "	" "	"	"	Death
33	F. G. Connell	Gunshot Wound	Longitudinal Enterorrhaphy	"	"	"
34	H. L. Nietert	Stab Wound	Circular Enterorrhaphy	"	"	"
35	" "	Gunshot Wound	" "	"	"	"
36	" "	" "	Longitudinal Enterorrhaphy	"	"	Recovery
37	A. McLaren	Laceration of Gut	Circular Enterorrhapy	Interrupted	"	"
38	" "	Stricture of Pylorus	Gastro Enterostomy	"	"	"
39	" "	Rupture of Intestine	Longitudinal Enterorrhaphy	"	"	Death
40	" "	Int. Obst. by Adhesion	Circular Enterorrhaphy	"	"	Recovery
41	" "	Abscess opening into Gut	" "	"	"	"
42	Denslow Lewis	Laceration of Gut	Longitudinal Enterorrhaphy	Continuous	Catgut	"

TABULATED LIST OF CASES IN WHICH THIS METHOD HAS BEEN EMPLOYED UPON THE HUMAN BEING.

No.	OPERATOR	INDICATIONS	OPERATION	SUTURE	MATERIAL	RESULT
43	Geo. T. Vaughn	Carcinoma of Colon	Circular Enterorrhaphy	Continuous	Catgut	Recovery
44	" "	Fecal Fistula	" "	"	"	"
45	W. Bartlett	" "	Longitudinal Enterorrhaphy	"	Silk	"
46	" "	Carcinoma of Rectum	Circular Enterorrhaphy	"	"	"
47	T. W. Huntington	Fecal Fistula	" "	"	"	"
48	" "	" "	" "	"	"	Death
49	" "	" "	" "	"	"	Recovery
50	" "	Sarcoma of Colon	" "	"	"	Death
51	" "	Tuberculosis of bowel	" "	"	"	"
52	" "	Carcinoma of Colon	" " (double)	"	"	"
53	A. C. Girard	Tuberculosis of bowel	" "	"	"	Recovery
54	G. B. Somers	" "	" "	"	"	"
55	Chas. Davison	Strangulated Hernia	" "	"	"	Death
56	C. E. Thompson	Stricture of Pylorus	Gastro Enterostomy	"	"	Recovery
57	" "	Carcinoma of Pylorus	Pylorectomy	"	"	Death
58	" "	Gunshot Wound	Longitudinal Enterorrhaphy	"	"	"
59	" "	Carcinoma of Pylorus	Gastro Enterostomy	"	"	"
60	" "	Fecal Fistula	Longitudinal Enterorrhaphy	"	"	Recovery
61	H. O. Walker	Tuberculosis of Cecum	Circular Enterorrhaphy	"	"	"
62	" "	Resection of Sigmoid	" "	"	"	Death
63	" "	Volvulus of Ileum	" "	"	"	"

As to the deaths which occurred in the foregoing table:

No. 4, died of shock on the day of the operation.

No. 9, died on the eighth day, and at autopsy the site of the operation was perfect.

No. 11, died one-half hour after leaving the operating table; patient in extremis at the time of the operation.

No. 19, died of shock, twelve hours after the operation.

No. 25, died of shock, one hour after the operation.

No. 32, died of shock one hour after the operation.

No. 33, died on the third day, liver, pancreas, and liver being injured.

No. 34, died on the third day; at autopsy the line of suture was found intact.

No. 35, died three hours after the operation.

No. 39, died on the third day after the operation, with suppression of urine.

No. 48, died on the fifth day; at autopsy the line of suture was found intact.

No. 50, died or shock, sixty-two hours after the operation; at autopsy the anastomosis was found to be in perfect condition.

No. 51, died on the fourth day; at autopsy one of the anastomoses was found in perfect conditon, the other to be at fault. "This is possibly explained by the extreme attenuation of the bowel wall, due to the original affection." (Tuberculosis.)

No. 52, died on the seventh day; at autopsy the anastomosis was found to be in perfect condition.

No. 55, died thirty-six hours after the operation.

No. 57, died on the fifth day, in collapse; "post-mortem revealed a sloughing of the bowel, side of the Murphy button; complete ring having been removed by button. Stomach and duodenum, closed by Connell stitch, was found united."

No. 58, died on fifth day, from undiscovered wound of kidney; post-mortem showed wounds in bowel united throughout.

No. 59, died three weeks after operation; post-mortem revealed complete union, no evidence of leakage.

No. 62, died soon after the operation; peritonitis existed at the time of operation.

No. 63, died soon after the operation; general peritonitis marked at the time of the operation.

CONCLUSIONS.

1. The suture that aims to include but a portion of the bowel wall is dangerous.

2. Because it is liable to fail to include any of the submucosa, in consequence leaving a weak stitch.

3. Because, if including any of the submucosa, it is almost certain to perforate the coat, and in consequence being open to the dangers of "capillarity."

4. By utilizing a through and through suture, the danger of yielding is excluded.

5. By employing a suture that perforates all coats of the bowel wall and is knotted in the lumen, the danger of "capillarity" is diminished.

6. It is undeniable that the most appropriate place for the knot, when all coats are perforated, is in the lumen of the bowel.

7. Undeniable, too, that when the submucosa has been perforated accidentally the knot ought to have been placed in the lumen.

8. Undeniable also, that many so-called Lembert stitches perforate the submucosa and thus convert an intentional non-perforating into an unintentional perforating suture.

9. And finally undeniable that, owing to the extreme tenuity of the submucosa coat (one-sixth of the thickness of the needle, which is to "penetrate, but not perforate" it), we are utterly unable to differentiate between a perforating and non-perforating Lembert stitch.

10. The logical conclusion, then, is that the ideal location for the last knot, and all knots in enterorrhaphy, is outside of the peritoneal cavity, in the lumen of the bowel.

11. As a chain is no stronger than its weakest link, it is then of practical import that the last one or two stitches be also perforating and tied in the lumen.

12. The diaphragm, by its valve-like action, is of great value in the prevention of leakage.

13. The tying of the knot in the method above described does in no manner interfere with the establishment of a rapid and firm union, nor does it tend toward leakage.

14. The side-knot or "square" stitch, in rendering a retaining suture unnecessary, is superior to the top-knot or "circular" stitch.

DISCUSSION.

DR. THOS. H. MANLEY, New York.—This subject of the mechanical joining of the intestines is one of great interest and importance to practitioners, because there are frequent occasions when it is necessary to do it. The operation for intestinal joining is very recent, notwithstanding that almost a century ago experiments were made along this line, usually without success.

We are very fortunate in having with us the gentleman who is among the first pioneers of America in intestinal surgery, the first in the field in this work on intestinal anastomosis. I refer to the father of Dr. Gregory Connell, Dr. M. A. Connell. He was the first to show by experimental work that the so-called perforating stitch was a safe and effective means for intestinal anastomosis, and most extraordinary to note, it was several years after his contribution appeared that any surgeon seemed to have the nerve to take up the work; this was held back entirely through theoretical objections and these objections were based entirely on false bacteriological teaching. For example, it was claimed that the through and through suture would soil the peritoneum and on that ground it was ignored and no one offered, for some years, to take it up. I had the good fortune to meet a student of Dr. Connell's in New York and brought this same objection up. I could not conceive how it was possible to be correct. He suggested that we try it on the dog, which we did, and it invariably resulted in the dog scarcely missing a meal, and we didn't lose a dog. I then had the opportunity of using it on the human being, and I am the first surgeon in America who used the Connell suture in intestinal anastomosis in an instance where I removed nearly a yard of intestine, with entire success. It is safe, it is simple, it is effective, and where is the house that you may go into, if you have not got your kit of instruments with you and the things necessary for an extensive operation, that you will not find a round

needle and a little silk thread? It is not confined to any particular type of anastomosis, but for the uniting of the intestines under any circumstances. If we find the intestine enlarged and thickened to almost cartilaginous resistance and it is impossible to do an end to end anastomosis, we simply slie one over the other and join laterally. This will do the work particularly well, because of its great simplicity.

With reference to the Lembert and the in and out sutures, the latter cannot accomplish what is sometimes required in certain situations; here the Lembert suture may be substituted; but where we want to bring the ends of the intestine together and must have a firm grip, where we must unite the serous surfaces and hold them firmly for several days, here is where the Connell suture does the work better than any other.

In regard to the time it takes for the serosa to become firmly bound together, one will say that after twenty-four hours, another after forty-eight hours. When asked as to the proof of this it may be said that it is so in the dog; but would you contrast a healthy dog with an exhausted man or woman and expect as great a tendency to union? As a matter of fact, in many cases, we don't get firm union for several days, and we have a leakage, though this is not an objection, because we have always provided for this escape of fluid. We prefer this to a button, or to any other procedure where we may have a leakage and gangrene following.

Dr. Emil Ries, of Chicago.—I operated on a case after the Connell method over two years ago. This suture was low down in the pelvic colon, and the patient has been examined repeatedly and found to be in perfect health. The seat of the operation can be reached through the rectum and there is no stenosis, no stricture, and the patient is able to be about and has daily natural evacuations.

Dr. H. C. Wyman, of Detroit.—I have listened to this paper with a great deal of interest. The historical features are particularly interesting, and I desire, as one who has had some experience in intestinal suturing, to express my approbation of this method. It has long appeared to me that if we could devise some way by which we might crimp the extremity of the intestine in cases where we have a wound and desire to make an end to end approximation and carry through and through from the inside of the gut, we would reach an ideal approximation. That, of course, is absolutely impossible, and this method devised by Dr. Connell, which is the result of years of careful study and research, gives us the very best

method we have today in bringing about an ideal result. I was particularly pleased with the demonstration set forth by the doctor in his paper. I think that sometimes the method has been in a measure misunderstood and misapprehended, owing to, as has been said, a deep seated notion pertaining to the danger growing out of through and through suture. This, however, is fully set aside by the paper. When we made an approximation—an end to end approximation—we simply proceeded to do it in the most rational way.

DR. C. E. RUTH, Keokuk, Ia.—I simply want to express my gratitude to the Connells for the work they have done with the sutures. I had the good fortune to see the senior Dr. Connell do his work at Wauwatosa, in which he used the suture. I don't feel that we are limited in our advantages with this suture to the rapidity of its use. The square method—the through and through method—seemed to give greater security in the approximation of serosa to serosa than any other plan that gives an equal surface to hold. Though I have not used it in the living subject, I have used it experimentally and am satisfied with it. Where the use of the suture in the human subject has resulted unfortunately, it is not blamable to the suture, but arises from the condition of the patient.

DR. CONNELL, in closing.—Dr. Manley is correct in saying that this method is merely a modification of that of M. E. Connell. That method did not meet with general adoption because of the penetration of all the coats of the bowel wall. It was in an effort to remove this objection to, and to improve upon, the older method, that I succeeded in placing the knot within the lumen upon the mucosa. This is practically the only difference between the method of M. E. Connell and continuous suture that I have described.

VI.—CANCER OF THE UTERUS IN THE MISSISSIPPI VALLEY.

BY EMORY LANPHEAR, M.D., PH.D., LL.D.,

ST. LOUIS, MO.

Surgeons of New York and Philadelphia do not, as a rule, favor hysterectomy for cancer of the uterus, believing that when the disease is advanced far enough to be recognized, it is too late for radical cure. Those of the Mississippi Valley

operate upon practically every case in which there is a chance of prolonging life for even a brief period. Vital statistics show the difference in results.

The population of the Mississippi Valley is 41,113,000; that of New York and Pennsylvania, 13,500,000—we have three times their number of inhabitants. Yet the Census Bureau reports for 1900 show only 679 deaths from uterine cancer in our territory as compared with 1,101 in theirs! In the same proportion we should have had 2,000.

But—it may be argued—perhaps New York and Pennsylvania have four times the number of cases of cancer in proportion to population than has the Mississippi Valley. For purposes of comparison we cannot take the total number of deaths from cancer in each territory, as that would include cases which would be operated upon in the West, but allowed to die in the East, but we will take cancer of the breast (on which everybody operates, East and West), cancer of the stomach (on which nobody operates, East or West), and cancer of the uterus, (on which the West operates and the East does not—*i. e.,* radically).

From the same report we learn that there were 874 deaths from cancer of the breast in the Mississippi Valley; in New York and Pennsylvania, 613. In the Valley States the deaths from cancer of the stomach were 3,776; in the two great Eastern States, 1,785. In the two latter we have about the proper proportion; in the former a great disproportion. This is more apparent when put in tabular form, thus:

	Population	Deaths from Cancer of Breast	Deaths from Cancer of Stomach	Deaths from Cancer of Uterus
Mississippi Valley. . . .	41,113,000	874	3,776	679
New York and Penn. .	13,500,000	613	1,785	1,101

As will be seen, here is a disproportion of nearly 4 to 1.

What must be our deduction from these figures? Necessarily that Western surgeons perform hysterectomy more often than Eastern surgeons, and that their work either cures a large percentage of patients, or results in recurrence in other internal organs (hence mortality figures are not in-

cluded in "deaths from cancer of the stomach"). To cover the situation thoroughly, it may be said that the disproportion is due to

(*a*) A large proportion of cures in the West;

(*b*) Quite a large proportion of deaths following operation: statistics showing death from shock, peritonitis or sepsis instead of cancer; and

(*c*) Post-operative recurrence in other parts.

To determine, if possible, how much can be attributed to the first of these causes (perfect cure following operation), letters were sent to 200 operators in the Mississippi Valley, requesting report of the number of patients afflicted with undoubted carcinoma uteri who had lived five years or more following hysterectomy. A large number could report none cured; but 70 operators report 289 patients who have lived more than five years without recurrence—the diagnosis being confirmed by the microscope in most cases. Those who reported success are as follows:

Name of Reporter. Residence.	Number of Cases.	
T. J. Beattie, Kansas City, Mo.	2	(1)
Y. H. Bond, St. Louis, Mo.	1	
Waldo Briggs, St. Louis, Mo.	3	(2)
W. M. Bailey, Detroit, Mich.	3	
J. E. Buchanan, St. Louis, Mo.	2	(3)
J. F. Baldwin, Columbus, Ohio	4	(4)
C. L. Bonifield, Cincinnati, Ohio	1	
A. C. Bernays, St. Louis, Mo.	6*	
A. H. Cordier, Kansas City, Mo.	2	(5)
H. C. Crowill, Kansas City, Mo.	1	(6)
O. B. Campbell, St. Joseph, Mo.	3	(7)
W. B. Craig, Denver, Colo.	5	(8)
A. M. Cartledge, Louisville, Ky.	3	
G. S. Coon, Louisville, Ky.	5	
H. S. Cocran, New Orleans, La.	19	(9)
Geo. W. Crile, Cleveland, Ohio	2	
E. J. Doering, Chicago, Ill.	1	

*This includes the first vaginal hysterectomy made west of the Mississippi.

F. B. Dorsey, Keokuk, Iowa..... 7
F. A. Dunsmoor, Minneapolis, Minn..... 3
W. B. Dewees, Salina, Kans..... 1
L. H. Dunning, Indianapolis, Ind..... 5 (10)
Richard Douglas, Nashville, Tenn..... 1
W. B. Dorsett, St. Louis, Mo..... 4
Paul F. Eve, Nashville, Tenn..... 1
Jos. Eastman, Indianapolis, Ind..... 6 (11)
Pinckney French, St. Louis, Mo..... 3 (6)
J. Frank, Chicago, Ill..... 1
A. L. Fulton, Kansas City, Mo..... 2 (12)
A. H. Fabrique, Wichita, Kans..... 1 (2)
F. C. Ferguson, Indianapolis, Ind..... 1
Louis Frank, Louisville, Ky..... 1
J. D. Griffith, Kansas City, Mo..... 5
W. J. Gillette, Toledo, Ohio..... 4 (13)
W. John Harris, St. Louis, Mo..... 3
B. E. Hadra, Dallas, Texas..... 1
R. B. Hall, Cincinnati, Ohio..... 4
T. H. Hawkins, Denver, Colo..... 4 (14)
J. W. Heddens, St. Joseph, Mo..... 1
W. H. Humiston, Cleveland, Ohio..... 2 (1)
Henry Jacobson, St. Louis, Mo..... 1 (3)
A. F. Jonas, Omaha, Neb..... 8
Willis P. King, Kansas City, Mo..... 1 (3)
J. H. Kellogg, Battle Creek, Mich..... 1
Denslow Lewis, Chicago, Ill..... 14
E. S. Lewis, New Orleans, La..... 3 (15)
H. W. Longyear, Detroit, Mich..... 1
Emory Lanphear, St. Louis, Mo..... 28
E. L. Moorhead, Chicago, Ill..... 3
Paul Michinard, New Orleans, La..... 6 (16)
L. S. McMurtry, Louisville, Ky..... 1
W. J. Mayo, Rochester, Minn..... 6 (17)
J. C. McClintock, Topeka, Kan..... 1
R. Matas, New Orleans, La..... 2 (3)
H. E. Pearse, Kansas City, Mo..... 1 (18)
Mary H. McLean, St. Louis, Mo..... 2

Reuben Petersen, Ann Arbor, Mich.....	1	(1)
A. J. Puls, Milwaukee, Wis.....	1	
H. O. Pantzer, Indianapolis, Ind.....	4	(19)
I. B. Perkins, Denver, Colo.	2	
E. H. Pratt, Chicago, Ill.....	1	
L. E. Russell, Cincinnati, Ohio.....	1	
W. O. Roberts, Louisville, Ky.....	1	
Hunter Robb, Cleveland, Ohio.....	2	(20)
O. S. Runnels, Indianapolis, Ind.....	5	
Frances Reder, St. Louis, Mo.....	3	
J. E. Summers, Jr., Omaha, Neb.....	2	(21)
D. A. K. Steele, Chicago, Ill.....	1	(22)
L. Schooler, Des Moines, Iowa.	2	(20)
Willer Van Hook, Chicago, Ill.....	1	
A. L. Wright, Carroll, Iowa.....	1	
T. J. Watkins, Chicago, Ill.....	2	
C. H. Wallace, St. Joseph, Mo.....	1	(2)
N. W. Webber, Detroit, Mich.....	2	
W. H. Wathen, Louisville, Ky.....	3	(23)
J. W. Withrow, Cincinnati, Ohio.....	1	
E. Younkin, St. Louis, Mo.	1	

(1) Cancer of body of uterus only.
(2) Not confirmed by microscopic examination.
(3) Cancer of cervix only.
(4) One of cervix; three of body.
(5) Dr. Cordier now uses the Paquelin cautery in preference to hysterectomy in all far-advanced cases.
(6) Dr. Crowell reports "most cases lost sight of"—a complaint of most operators.
(7) One of body; two of cervix.
(8) Three of body; two of cervix.
(9) Fifteen of body or fundus; four of cervix.
(10) Of thirty cases operated more than 5 years ago, 5 have lived more than 5 years without recurrence; 5 were lost track of and 20 died of recurrence: 16⅔ per cent. of perfect recoveries—counting the 5 lost cases as having also died of cancer.
(11) Figures furnished by Dr. Joseph Rilus Eastman.
(12) Dr. Fulton is not absolutely certain these cases were malignant, as the diagnosis of cancer was made from clinical features alone—no miscroscopic examination being made.
(13) Diagnosis confirmed by microscope in every case. Dr. Gillette adds: "The present rage to decry vaginal hysterectomy as curative of uterine cancer is wrong; it is not true that cancer of the cervix is never cured by it."
(14) Dr. Hawkins adds: "I think the number should be eight instead of four, but am not absolutely sure. I am satisfied that my results from hysterectomy for cancer done during the past 5 years will show a much larger percentage of perfect cures; my operations are

more thorough, the technic better and the class of cases selected far more favorable."

(15) One case recurred after eight years! Dr. Lewis adds: "My experience in radical cure is not satisfactory."

(16) After an extensive experience Dr. Michinard now limits his hysterectomies to cases of early cervical cancer.

(17) Two of the body and four of the cervix.

(18) Dr. Pearse had other cases, but this was the only one confirmed by microscopic examination.

(19) One case had recurrence in 6 years.

(20) Both of fundus.

(21) Dr. Summers concludes his report thus: "It is my opinion that hysterectomy for cancer of the uterus is unjustifiable except when the disease is confined exclusively to the body; more years of life can be saved by other procedures."

(22) Abdominal hysterectomy.

(23) Dr. Wathen thinks he could report more than 20 if patients had not been lost track of.

It will be noted that most of these men are teachers in medical schools, or connected with large hospitals in which the services of skilled pathologists are depended upon to confirm the clinical diagnosis.

Formerly three years was regarded as the period beyond which a cure might be declared to be attained. Had a request been made in this correspondence for statistics concerning patients of more than three years' survival, the figures would have been swelled many hundreds—first, because such a large proportion lives beyond that limit; second, because so many more patients can be located three years after operation, and, third, because we are all now doing better operating than formerly, and, in most instances, at a much earlier period in the development of the disease; as our general practitioners become better qualified to recognize the disease early, the number of radical cures will increase. In my own work I have more than one hundred women living three or more years after vaginal hysterectomy for undoubted carcinoma uteri.

My own records show 263 hysterectomies for cancer. Faithful efforts have been made to keep in touch with the survivors, but as they have come from every part of the South and West—from Florida to Oregon—many have passed beyond the field of observation and report. That more than one-third died from recurrence is certain. If exact figures were obtainable, it is probable that more than half

had internal cancer as the cause of death. Of these 263 definite information has been received that 28 lived more than five years after operation.

In view of figures such as these dare our Eastern brethren still contend that hysterectomy for radical cure is not advisable? Even though recurrence follow operation the life of the woman has been prolonged; pain has been lessened; existence rendered less distasteful to patient and friends; and the surgeon of necessity feels that he has given the sufferer every aid at his command.

This is not to be construed as a plea for hysterectomy in cases known to be hopeless.* It is but another presentation of the well-known fact that cancer can be cured in some instances by thorough, careful work. Hysterectomy is not to blame for the numerous deaths from cancer of the uterus—practically every case might be cured by early recognition and operation. As Dr. Howard Crutcher, of Chicago, says (in replying that he cannot tell how many of his patients lived five years after hysterectomy—not many, though): "The operation is not at fault, but the conditions. A late operation, so full of terrible significance to the surgeon, appears to be so firmly established, even in many doctors, that science seems almost helpless in the face of so much blind cowardice and ignorance."

Of the figures presented herein it may be said: No matter how many hundreds—perhaps thousands—of vaginal hysterectomies may be represented in this list, which gives 289 cures, the fact that 289 *women have been saved* in the Mississippi Valley by our bold and skillful surgeons speaks far more eloquently than can all the Philadelphia and New York theorists, with their experience. In cancer of the uterus, operate first—theorize afterward!

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* One cannot always be certain, however great his experience, that a given case is always without hope. Some five years ago Dr. J. J. Fyke, of Odin, Ill., brought to me a woman 73 years of age with the cervix eaten away and the body all involved. Believing the case to be hopeless I declined to attempt a cure and referred the patient to Dr. F. D. Mooney for treatment at the Missouri Baptist Sanitarium. He curetted (and microscopic examination of tissue removed showed undoubted carcinoma) and burned with Paquelin cautery. In three weeks the patient returned home and spent six weeks in bed; then came back to the hospital and begged for hysterectomy for relief from her unbearable pain, which morphine failed to control. I then removed the upper part of the vagina, with what remained of the uterus, together with the tubes, ovaries and all of the plevic connective tissue possible. I gave a prognosis of death in six weeks. The woman is still alive and in perfect health!

DISCUSSION.

DR. C. E. RUTH, Keokuk, Iowa.—My early experience in operations for cancer of the uterus, especially in far advanced cases, was very unsatisfactory as to operative morality, and in recurrences I was very much inclined to take the view that our New York and Pennsylvania people endorse in the matter, But lately, owing to the improved method of operating, I feel like making a decided change, and have done so in my work and opinion. A year ago I stated before the Iowa State Medical Society that I did not consider any man justified in attempting to do a hysterectomy for sloughing carcinoma of the uterus and making a complete job at a single sitting, but advocated it in stages, as the essayist says, when he referred to the old lady where he used the currette and Paquelin cautery, and subsequently did the hysterectomy. I advised that in all cases. It was only a little while after making that statement that a woman came to me with a slouging carcinoma of the uterus involving the upper vagina, the whole of the cervix being gone and the body involved. She said she would die in that condition and wanted me to try and save her. I could not resist that, and as time was very important, I made a suprapubic incision and secured everything from above, freed the broad ligaments and after cutting down as close to the vagina as I could without opening into it, I passed two sutures on the bladder and rectal side and attached to the fundus of the uterus, so that when drawn upon it would perfectly close the vagina from above. Then I attacked the situation from below, using the Paquelin cautery to destroy the sloughing part of the uterus and, after scraping away the debris, filled the vagina with pure carbolic acid, and following it immediately with alcohol, and proceeded to remove the uterus from below. The patient made a good recovery. Four weeks after the primary operation I took the cautery and destroyed the entire vaginal vault, so that if there had been any stray cells escape from the previous operation I would be able to include them in this way and destroy them. This operation was done a year ago. I saw the woman only a short time ago; she is perfectly well. I simply speak of this case as being a plan which served me well in one of those desperate cases which would have died long ago without surgical intervention.

DR. J. RILUS EASTMAN, Indianapolis, Ind.—I would like to be informed on two points. I would like to know whether in these reports from operators to whom the essayist sent

letters he received information to the effect that the suffering of these women after hysterectomy was less than before. In those cases where the carcinoma recurred in the scar, was the suffering less than prior to the operation? It has been my observation that when cancer recurs after complete hysterectomy the suffering of the patient is a great deal less than before the operation. It certainly seems that the totality of suffering relieved in all the women concerned in Dr. Lanphear's report must have been very great.

I would like to ask also if in the reports received there was mention of use of Macenrodt's operation, the method by which the uterus is dissected out with a hot cautery knife, so that the cancer cells are destroyed and the lymphatic channels closed by heat as the operation proceeds. This operation has been followed by a relatively small proportion of recurrences, and is as easy of execution as is the extirpation of the uterus with sharp, cutting instruments. It deserves serious consideration.

Dr. A. M. Hayden, of Evansville, Ind.—I would like to know if, when the disease is confined to the cervix, the opportunity for recovery is not much greater than when it is in the body of the uterus. My experience is that cases involving the body of the uterus do not do as well as when confined to the cervix. I have had several cases of cancer of the cervix, and these have always done better than when the body of the uterus is involved. I operated on a case of cancer of the cervix eight years ago, and the patient is still living. I believe, as a rule, cases of cancer in the uterus commencing in the cervix are more favorable for operation than those primarily involving the body of the uterus.

Dr. Emil Ries, Chicago, Ill.—As my name has been mentioned in connection with operation for carcinoma, I will make a few remarks.

As to the priority of the operation I need not say anything, because my paper was the first paper printed at the time it was read, and it is open to everybody to see when that was done. The main thing in this paper is the claim made at the time that vaginal hysterectomy is inadequate for the removal of everything that has to be removed. Not alone the uterus, but the broad ligaments, part of the vaginal tissue surrounding the vagina, the tubes, ovaries and pelvic lymphatics, must be removed. I made that claim, because I was convinced from microscopic investigations that carcinoma would invade the lymphatics long before it was

suspected. When I began to use this method I was alone in it, but now it has been taken up to a large extent in Europe and America, and those who have made careful examinations bear me out in every point made. I don't do any more vaginal hysterectomy for carcinoma of the cervix.

This operation will not cure inoperable cases of carcinoma, and if I had wanted to operate on cases that were inoperable by the vaginal route, I could have operated upon ninety cases for every nine I operated on, but I have refused every case where the uterus was not freely movable. Three cases I allowed myself to be persuaded to operate upon, although I felt that they were unfit for operation. In one I tore a hole in the common iliac vein and in another I tore a hole in the external iliac vein. In the third case, the ureter was involved, and I dissected off three inches of the ureter. The woman died from uremia. The other cases recovered and are alive.

I want to thank Dr. Lanphear for two things. First, for what he says in regard to getting these cases early and operating in the early stages. That is a most important point and should be drummed into physicians at every meeting. When the broad ligaments have become involved and the lymphatics are enlarged, it is too late for any kind of operation. Secondly, I want to thank him for bringing these statistics, which prove the inefficiency of the vaginal operation. In the whole field of gynecological practice, vaginal hysterectomies are done by the hundred and occasionally the operators have one case live five years. This simply proves that vaginal hysterectomy does not do the work. Let us try the new method.

Dr. Lanphear, in closing.—I want to thank those who discussed the paper.

In regard to carcinoma of the body as compared with carcinoma affecting only the cervical portion, the statistics will show, when published, that an exceedingly large proportion of cases of cancer of the body of the uterus are cured, and a very small proportion of cases of cervical cancer are cured. It is a peculiar fact that carcinoma of the fundus, as a rule, is far more amenable to cure by vaginal operation than any other form of uterine carcinoma. Dr. Ries's operation is particularly applicable to primary cervical cancer; and even those cases, unless operated on very early, will recur. A few of the reporters had exactly opposite results to this.

due to the fact that they had been advocating very early operation on cancer of the uterus cases, which would give even the very best chance of recovery.

I am still in doubt as to the relative merits of the suprapubic and the vaginal operations in spite of the fact that I know Dr. Ries to be one of the most successful surgeons of the world to-day, and that his advocacy is based, not upon strictly theoretical grounds, but upon practical experience also. The reason I have not done the operation more often since Dr. Ries has called my attention to his method, is: First, that I have become so familiar with vaginal work that I feel I can get at the uterus about as readily from below as I could from above; and, secondly, because I felt that the cases in which his operation seemed imperatively demanded were exactly cases in which I have heretofore felt no radical operation should be attempted. However, many of the cases I have operated upon seemed to be easy at examination, and before the operation terminated they proved to be most difficult; on the other hand, some of those which seemed to be most formidable turned out to be easy; so that I have not been able to select the proper cases for its trial. In regard to the suffering of the patients in recurrence, I think it the experience of nearly every operator that recurrent carcinoma is practically painless as compared with the original disease. Where recurrence takes place in the scar there is liable to be pain, but a large proportion have recurrence far above the scar, as in the spleen or some abdominal organ; and that is a most earnest plea in favor of operating even on cases known to be inoperable—not, perhaps, by hysterectomy, but by a method of which I shall speak in a moment.

Attention has been called to the better work we are doing now. I am satisfied that the results of the work done in the last five years will show a much larger percentage of cures, for the operation is more thorough and the technic better, and the chances for recovery more favorable. I believe that is true of all operators, and I think the statistics of ten years hence will therefore show better results than those now obtainable.

In regard to recurrence, it is interesting to note that Dr. Lewis, of New Orleans, says one of his cases recurred eight years after vaginal hysterectomy; so that the assumption on which this paper is based that five years is the limit for recurrence is not correct.

In regard to the question concerning the treatment of

sloughing cases: Those are the cases in which we use the Paquelin cautery and burn out as much of the tissue as possible. In a number of cases recently I have had recourse to the X-ray, and I must confess that the X-ray in cancer of the uterus does not, as yet, promise much. It is giving excellent results in such cases as epithelioma of the lip and ear, but in cases of cancer of the uterus it has not been so successful, possibly due to the fact that we are not able with the present apparatus to concentrate the ray on the uterine tissue.

In conclusion I will say that, even though in subsequent years recurrence may occur in some of the 280 cases, it is a comfort to know that besides the cases which have been rendered more comfortable (and life greatly prolonged even though recurrence eventually occurred) by these operations. in the list of cured alone the operation has added more than 2,000 years to the sum total of human life and happiness.

VII.—CANCER OF THE VAGINA.

BY E. M. SUTTON, M.D.,

PEORIA, ILL.

Operation for Cancers.—Cancers situated in cervix uteri or post cervical involving vagina or rectum separately or together may be removed by resection of the sacrum at second or third foramen. Kocher says one side may be removed as high as the second foramen without serious result; vesical and rectal branches emanate from fourth and fifth sacral nerves and internal pudendal from third sacral. The latter supplies labia and skin, and therefore is not of serious consideration. The vesical and rectal nerves are not only derived from fourth and fifth sacral, but from inferior hypogastric plexus or pelvic plexus formed by continuation of the hypogastric plexus with branches from sacral nerves; therefore the latter may be sacrificed, since the hypogastric plexus supplies the viscera in the pelvis and is situated in front of the promontory of the sacrum, above the field of operation.

Arterial considerations are more important in resection of sacrum; the last step is accompanied with considerable hemorrhage from median sacral artery, the size of crow's quill.

It is derived from the aorta, and the sacralis lateralis, two on each side, superior entering second anterior sacral foramen, emanating posteriorly to skin, and is of rather large size. Inferior lateral is directed along anterior surface of sacrum to coccyx.

After removing the bone, the upper bleeding part of the wound should not be firmly packed with gauze, till arteries are secured and some pressure made by assistant while operation is continued as for removal of rectum, in case this is made necessary by extension of the growth. The levator muscle to sides of rectum is divided and branches of external hemorrhoidal arteries are severed, requiring clamps of ligatures. The next step is opening the cul-de-sac of Douglas', and can be facilitated by the assistant or operator with gloved hand, pushing cervix and vault of vagina upward and backward prominently into the wound; or better, leave cul-de-sac to later step. Careful packing in of laparotomy sponges with patient raised to semi-Trendelenburg position, protects peritoneal cavity and prevents prolapse of viscera.

Whether the growth involves rectum and vagina or cervix and vagina alone or all together, depends the next step. In the latter case, greater ease is obtained by clamping the rectum one inch above the involvement with second clamp close to the first, care being taken to prevent tearing the bowel and escape of infectious substances, dividing the bowel between clamps with cautery, destroying all possibility of infection at this stage, and from now on great care to prevent accident of escaping bowel material over so large a wound. The clamps should be short and stout, and should not be used for traction, but covered with gauze, and the upper ones packed away from the wound.

None but controllable hemorrhage occurs in dividing the tissues across the cul-de-sac. The uterus may now be retroverted, top of broad ligament clamped or ligatured, round ligaments ligatured, bladder separated anteriorly far down the anterior surface of uterus, cervix and vagina to near the end of urethra, if necessary, care being exerted to keep finger firmly on the surface of organs to be removed.

to avoid tearing bladder. Some bleeding occurs from vesical vessels at side of bladder and vagina, but control is to be had with ease if, after raising bladder from organs sufficiently, the broad ligament is incised onto the uterine artery as far from cervix as thought necessary to obtain normal tissue and the uterine arteries secured and uterus brought down as further separation of vagina anteriorily is conducted. The ureters remain off to side of pelvis and above, and should not be endangered by the above steps.

The vagina should now be cut across well below the involved part. The canal may be utilized for drainage by a rubber tube covered with gauze and oiled paper.

While dividing the lower end of rectum between forceps, as was done above by cautery, hemorrhage is controlled by many forceps, ligatures and pressure. The remaining fibers of levator and muscle are divided hemorrhoidal arteries, cared for by forceps before severing and ligated afterwards.

The tumor mass removed, the toilet of pelvic peritoneum is made, and abdomen closed without drain. The ends of the divided rectum can be brought together if desired to secure best functional result, using button or suture anastomosis, care being taken to protect the large wound from contamination by careful gauze packing, while the button is fixed in upper end, or suture placed.

If anus is removed, or time will not permit the completion of operation by uniting divided rectum, the fixation of proximal end should be made at upper angle of wound, or to side of wound, through incision of skin and gluteal muscle, by a few deep sutures (Hochenegg). If too much tension on the bowel exists, a silk guy suture should be taken from the upper angles of wound to a point higher up, drawing the deeper tissues nearer to the wound.

Abundant drainage should be provided for, salt enema given with whiskey, hypodermic injections of strychnin and digitalis, if required, and two nurses to care for the drainage, which should not be allowed to soil, removed often, and boric acid irrigations made. An apron of oxide zinc plaster attached to skin between the artificial anus and the

wound, the patient being kept on the side favoring drainage away from wound.

In this case it was found that the line of cleavage in dissecting the vagina was from below upward; hence the order was reversed by dividing the rectum and vagina below between forceps and continuing the enucleation to the uterus, dividing across lower cervical portion, opening the cul-de-sac and turning mass out over gluteal region, dividing sigmoid between clamps, closing peritoneal cavity, attaching sigmoid to skin through gluteal muscle on left side, as advised by Hochenegg, in event of anastomosis being impossible.

CASE. Mrs. M. F.; age, 45. Father died at the age of 70. Mother living and well at 86 years of age. Grandfather died at 83, and other grandfather by an accident. One grandmother died from lung fever and one from old age. No tumors or cancers in uncles and aunts. Never injured except by a fall on her back on the ice when quite young; hurt, but not disabled. Began menstruating at age of 14; regular, some pain. Always worked hard on a farm. Good health. Had four children; no difficult labors; no miscarriages. Mens., four days; regular; leucorrhea for years. Three months ago became yellow, to reddish of late. Bowels always constipated; last summer greater difficulty in moving bowels. Had backaches at times. Late last winter felt like going to stool, but could not defecate. Soreness resulted from riding. Pain when bowels move. Drawing, cramping through bowels. Bladder somewhat irritable. No blood in bowel movement. General condition good, except loss of appetite and weakness. Urinalysis shows normal kidneys.

Bowels became incompletely blocked when attending physician, Dr. Mansfield, was called and discovered the condition.

Diagnosis.—Primary cancer of the post-vaginal wall surrounding and involving rectum, upper two-thirds, producing stricture of the rectum. The specimen shows a large fungous mass at the vault of the vagina and extending on to the posterior surface. The rectum is stenosed by overgrowth of fibrous tissue in the submucosa and around the muscle tunic. The circular muscle tunic is hyperplastic. The submucosa is thrown in longitudinal folds. It is non-malignant. The perirectal mass is due to hyperplasia of fibrous tissue. It is mixed scar and adipose tissue. The carcinoma begins in the

vagina and extends into the perivaginal tissue and into the rectum as far as the inner side of the muscle tunic.

Sections were made from the mass in the posterior wall of the vagina, which show it to be a squamous cell carcinoma, with extensive pearl formation, springing from the vagina.

Primary cancer of the vaginal wall in two cases have come to my observation, the one reported here and one reported two years ago by incision through the vagina. The literature furnishes numbers of cases, usually far advanced and inoperable, but usually secondary to cancer of the uterus. Microscopical findings may mislead and the diagnosis of cancer be found when syphilis is the real disease; therefore allowance must be made for mistakes.

Many operations are reported of extirpation of these growths by vaginal and abdominal routes, the results of which are no better than operations made for extensive cancerous growths elsewhere.

The lymphatic invasion usually has taken place (the vaginal growth being usually secondary to cancer of cervix or uterus), either by backward flow of the lymph, or by implantation. Cancer post-vagina disseminates by the lymphatics leading to the iliac glands, and the sacral along with the lymphatics from the cervix uteri.[1] Any operation to be successful must be made so as to prevent this dissemination.

The sacral route for hysterectomy is an old operation and abandoned on account of high mortality, but operations for cancer of the rectum by the sacral route have been more successful. Hochenegg has had 30 permanent cures out of 174 operations, the patients remaining well nine to fifteen years. The mortality averages, from comparison of collected cases from various sources, from 15 to 20 per cent., rather high for Kraske, who gives it as 9.8 per cent.[2]

The mortality in these operations has been chiefly due to (1) hemorrhage, or, (2) septicemia induced by the foul condition of wound infected by feces.

Improved technique would reduce this mortality. C. A. Herzfeld, Vienna, did first anatomical experiment, applying

Kraske operation for hysterectomy. Hochenegg first operated on the living, and Gersung reports one case. Both patients recovered. Hegar modified, making temporary resection flap.

Eiselberg resected coccyx and removed cancer of vagina and rectum successfully, and Possi mentions the case as worthy of imitation.[3]

Montgomery reports a case successfully operated on. Tumor mass fell through rectum as partial invagination of cancerous rectum involving the vagina and adherent to the cervix. Resection of sacrum on left side, gut ligated and divided vagina opened, uterus pulled down and the mass was removed; the sigmoid sutured, and the patient was able to be about the house.[4]

From Ind. Cat. Surg. Gen. office some fourteen cases are reported of various conditions of the disease but with few exceptions nothing was done toward the removal or cure. The absolute hopelessness of these cases left to nature should justify the most radical procedure promising freedom from the acute pains and death.

Mrs. F., reported in this paper, now does ordinary work about home, goes about and is looking well.

The healing was unattended with dangerous symptoms, a normal pulse and temperature prevailing throughout the course of eight weeks' time required at the hospital, and should recurrence occur in loco, the modern X-ray therapy could be most effectively applied and still promise of longer life hoped. At present, eight months since operation, there are no signs of recurrence.

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VIII.—THE TREATMENT OF EXTENSIVE RECTAL STRICTURES.

BY EMIL RIES, M.D.,

CHICAGO.

Extensive strictures of the rectum are troublesome by producing constipation and purulent discharge. They undermine the general health by toxæmia, due to absorption from the overloaded intestinal tract, and by sepsis produced by the associated ulcerations, abscesses, sinuses, and fistulas. They ultimately endanger life by termination in intestinal obstruction or, more acutely, by perforation into the peritoneal cavity.

There are three conditions which make the treatment of these extensive rectal strictures a dangerous task and are apt to lead to disappointment in the results. These three conditions are so intimately connected with the nature of the dis-

ease, and vary so greatly in their extent, that the operator is liable to encounter appalling obstacles, to surmount which any one of all the various methods of intestinal surgery may have to be employed in a given case.

These three dangers result from the septic condition of the field of operation, the changed anatomical relations of the parts and lastly from the menace of recurrence.

The danger of sepsis is of particular importance in this class of work, because to the chance of sepsis inherent in all ordinary bowel surgery there is added here a further risk from the ulcerations with resulting abscesses and sinuses. Whereas in ordinary bowel surgery we have to keep a watchful eye mainly on the bowel contents, we may encounter in this special work septic foci at varying distances from the bowel, abscesses having burrowed in unexpected directions and threatening every operative endeavor with virulent sepsis.

While these abscesses and sinuses constitute one change in the normal anatomical relations of the parts, they are not the only pathological metamorphosis. In consequence of chronic indurative inflammation in the tissues of the rectal wall and its surroundings, the rectum, ordinarily a fairly movable organ which may be detached with reasonable ease, becomes a rigid and immovable tube. It is then glued to the surrounding tissues by absolutely unyielding and hard newly formed masses. The normal landmarks are wiped out. Sometimes it is even hard to say where the bone begins and exudate ends. These pathological changes are apt to extend so high up that it becomes questionable whether a certain part is rectum or sigmoid flexure bound down by exudate. The sigmoid may be so changed that, instead of the normal mobility, it presents the appearance of a much shortened and rigid organ.

After operations in such problematic surroundings, recurrences occur with disappointing frequency, due especially to the fact that whenever any part of ulcerated or indurated bowel is left behind, the natural progress is toward reformation in a stricture. As all operators in this field know, it is very difficult indeed to be absolutely certain that no diseased

bowel has remained behind. Whenever any diseased portion of the bowel is left, it may, under the irritation of the fæcal current, again break down in an ulceration, again lead to formation of inflammatory exudate, the shrinking of which must reproduce the original stricture.

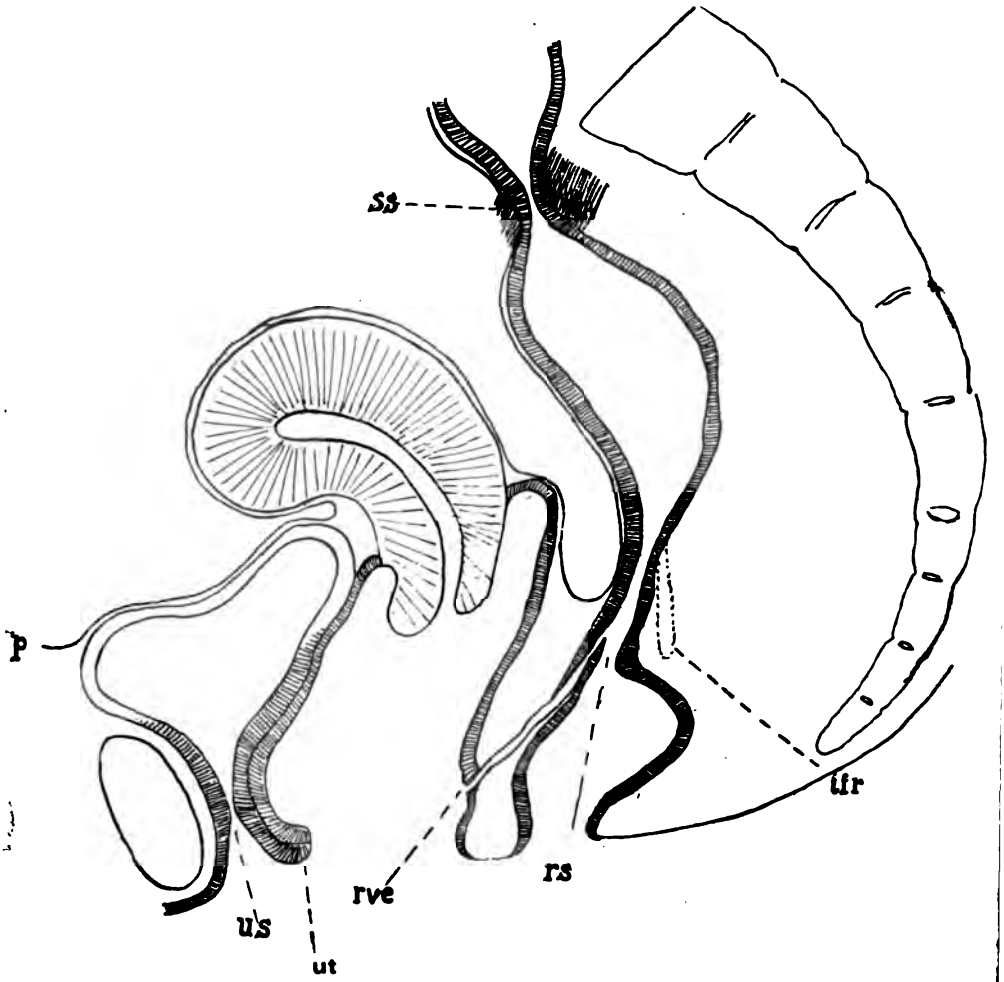

Fig. I.—Condition before operation. p—Peritoneum. ss—Stricture of sigmoid rs—Stricture of rectum. ifr—Internal fistula. rve—Rectovaginal fistula. ut—Urethral tear. us—Urethral stricture.

The methods at our command, which are to be considered here, are those which attempt to replace diseased bowel completely by healthy bowel. I leave out of consideration methods which by diverting the fæcal current are intended

to give the bowel a chance to heal and recover normal functions. The really severe cases never yield to treatment by colostomy or linear proctotomy. The really severe and extensive cases require plastic operations on the continuity of the bowel, by which the fæcal current is conducted throughout along healthy bowel.

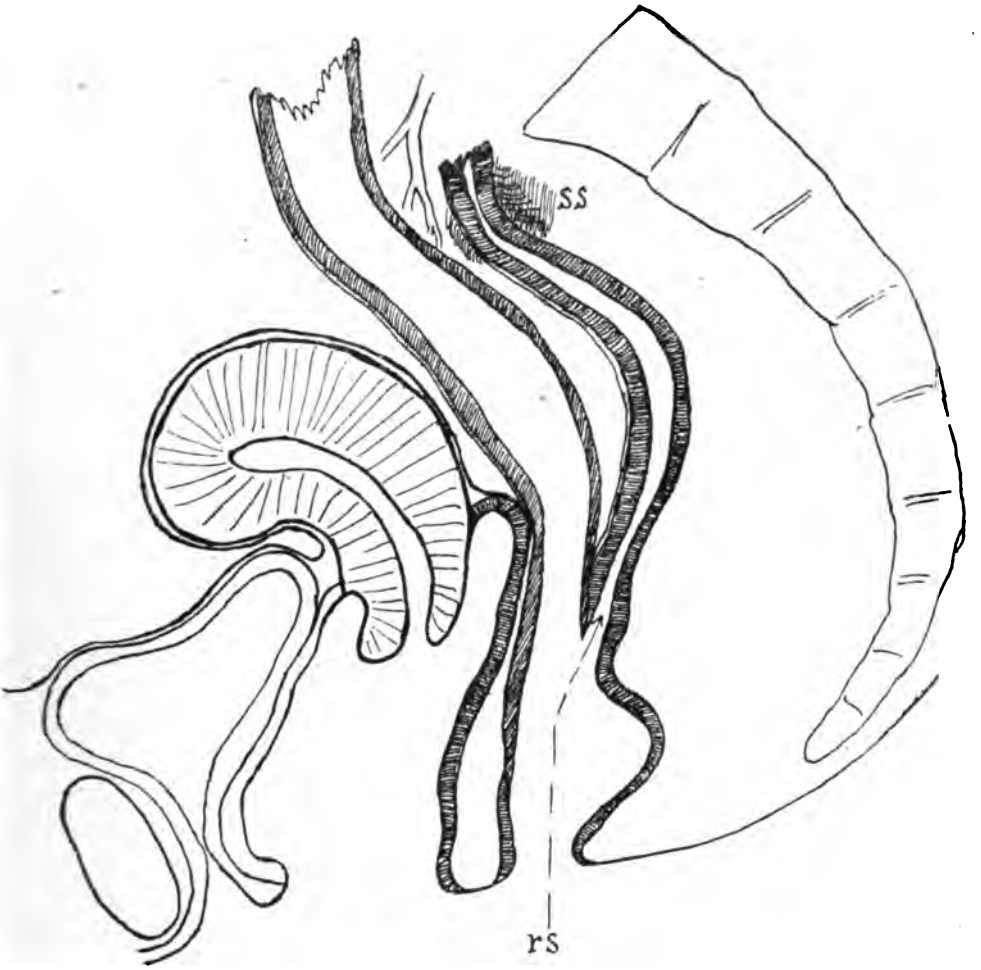

FIG. II.—Operation completed. rs—Rectal stricture. ss—Stricture of sigmoid.

In order to achieve this, two methods have been in use, until I devised the new operation, to which we shall presently come. These two methods are end-to-end anastomosis after

resection of the diseased portion, and side-to-side anastomosis without resection.

The first method of resection of the diseased bowel, though absolutely correct in principle, is practically often extremely difficult, sometimes impossible. It may become impossible in consequence of great extent of the stricture and of the associated conditions of ulceration, formation of abscesses and fistulæ, and infiltration of the surrounding tissue. In uncomplicated strictures it is often satisfactory, though its usefulness is endangered by the possiblity of diaphragm formation in the rectum, if the end-to-end anastomosis does not in reality amount to pulling down the rectum from above to the anus itself.

The side-to-side anastomosis without resection is a clever invention of Dr. Bacon's. Its principle is to get around the stricture by pulling a loop of intestine above the stricture down to a point below the stricture and joining them by a Murphy button. An additional feature is the enlargement of the opening thus made by producing pressure necrosis of one side of the strictured bowel by a clamp. The latter procedure is not entirely free from danger and is of doubtful value. But aside from minor objections to this method, the greatest disadvantage is to be found in the fact that the available loop of bowel above the stricture, which is utilized for the anastomosis, has to be doubled upon itself. This feature of the operation makes it useless wherever the stricture is extensive and the bowel above the stricture is not exceedingly movable.

The case which gave me occasion for the development of a new method, based on a different and more novel principle in intestinal surgery, is the following:

Mrs. I. N., twenty-five years old, married at the age of eighteen, confined at the age of nineteen at a hospital of this city. The confinement was accompanied by considerable hæmorrhage. Seven years ago the patient acquired syphilis from her husband. Since the confinement, she notices the escape of fecal matter through the vagina. For years she has had trouble with her rectum, the main complaint being of constipation. Of late this has grown so bad that she is unable

to pass any solid fecal matter, and the bowels move only when she produces a liquid condition of the feces with the aid of drugs. She is extremely emaciated and pale; she is frequently nauseated and has no appetite. She has not menstruated for several months. She weighs 82 pounds, being 5 feet 3 inches in height.

Examination reveals a number of scars on the body, some due, in all probability, to the syphilis, some to accidental injuries. The pelvic organs present the following condition: Vulva patulous; the perineum consists of an upper part composed of skin only and a lower portion containing part of the sphincter, the two portions being separated by an opening leading into the vagina, a vulvo-vaginal fistula. The posterior wall of the urethra is torn away from the anterior wall to the extent of about one inch, and the orifice of the remnant of urethra is so narrow that an ordinary catheter cannot be inserted—stricture of the urethra. The posterior column of folds of the vagina is torn away from the perineum. Immediately below the end of the column of folds a narrow fistula leads into the rectum and discharges (during the examination) liquid fecal matter. A finger introduced into the rectum about two centimetres is arrested by a callous stricture, which is so narrow that it does not even admit the fifth finger. Its calibre is of about the size of a match. That portion of the rectum immediately above the stricture is felt through the vagina as a hard string extending upward for more than 5 centimetres. The vagina is wide, the uterus small and atrophic. Bimanual palpation of the pelvic organs reveals as an additional and somewhat puzzling finding high up on the brim of the pelvis a hard, immovable mass around the rectum which is assumed to be an exudate around the rectum caused by ulcerations, which in their turn were caused by the syphilis and kept up by the stagnation of feces above the stricture.

The rectal orifice of the rectovaginal fistula could not be felt below the stricture, and I could not tell how far up the stricture extended. It was evident that stricture and fistula ought to be done away with by one operation, and the one which presented itself to me as the most natural and useful one was an operation which is frequently done for neoplasms of the rectum and which has been utilized by Segond in rectovaginal fistula without stricture, and by Schede and others in cases of stricture and fistula. I intended to cut the rest of the sphincter ani and the rectovaginal

sæptum up to the fistula and higher up if necessary, follow the stricture to its upper end, then dissect out and remove the entire portion of the rectum, pull it down and sew it to the anal mucosa, then do a perineorrhaphy. This would do away with the fistula, the rectal portion of which would come away with the removed portion of rectum and the vaginal portion of which could be dissected out and then sutured with the perineorrhaphy.

I began my operation accordingly on June 19, 1897, at the Post-Graduate School, in the presence of our students. I split the perineum and posterior vaginal wall until the fistula was laid open in its entire length. A short internal fistula in ano was discovered immediately below the stricture. It was carefully curetted. The incision had now laid bare the recto-vaginal fistula, but I had not arrived at the upper end of the stricture. I therefore continued my incision through the recto-vaginal sæptum, working in cicatricial tissue outside and along ulcerated mucous membrane inside the rectum. I had reached the peritoneum of the cul-de-sac, but I had not reached normal rectum which could be utilized for plastic work. I therefore made a change in my plan and intended to get hold of the sigmoid. I found that I could pull it down a short distance, but then it did not yield any further, and when I inserted my finger into the peritoneal cavity and palpated the sigmoid, I found that there was a second stricture in the sigmoid, very hard and immovably adherent to the underlying structures at the point where I had felt the mass before the operation. That explained why the sigmoid would not follow my tractions, and it obliged me to change my plan again. It was necessary to go higher up for a healthy portion of the bowel, and therefore the vaginal route had for the moment to be abandoned.

It would have been the simplest thing to perform a colostomy, and it would have undoubtedly saved the patient's life. But what would it have meant for a young woman of twenty-five years to have a more or less constant discharge of feces through an abdominal opening, with the prospect of having to keep this filthy condition until her death? It would have been little short of cruel to be satisfied with a colostomy, and I decided to try a more complicated operation.

After a median abdominal incision about 10 cm. in length, I inspected the condition of this sigmoid and found an extremely narrow, hard stricture about 4 cm. long intimately adherent to the pelvic wall, its mesentery so shrunken

that this portion of the gut was absolutely immovable. Above it the bowel was somewhat distended and remarkably freely movable as high up as I could feel. It was provided with well formed mesentery with numerous blood vessels. I proceeded now in the following way: About 3 cm. above the upper end of the stricture of the sigmoid, in a healthy portion of bowel with healthy mesentery, the bowel was cut in two, the assistants providing against the escape of fecal matter from the cut ends. The incision was continued toneum by any suture, but relied on the bowel and its mesentery were ligated. The strictured portion of the bowel was closed above with three layers of continuous, inverting catgut sutures.

Now a long artery forceps introduced through the vagina and the opening in the cul-de-sac took hold of the healthy colon and pulled it down toward the anus. There was hardly any tension of the bowel, so that it could be expected that stitches would hold the colon down until it had become firmly adherent. The abdomen was closed with silkworm sutures and the operation was completed through the vagina.

On returning the patient into the lithotomy position I found the lower end of the healthy bowel very close to the anus, and the entire length of the healthy gut fitting snugly into the opening in the cul-de-sac and the incision of the anterior rectal wall, so that I did not even close the peritoneum by any suture, but relied on the bowel and its mesentery to prevent leakage into the peritoneal cavity. The rectum and sigmoid were washed out and iodoform gauze was inserted. The descended end of the gut was fastened to the rectum below the lower end of the rectal stricture by four silkworm sutures. The vaginal edges of the recto-vaginal fistula were cut away, and so the entire incision in the vagina formed one straight line from the cervix to the anus. It was now closed with silkworm sutures and the sphincter also united by such sutures after a rubber tube had been inserted into the colon. Therewith the operation, which had lasted about an hour and a half, was concluded.

The condition created by the operation was therefore as follows: The vagina contained a row of sutures along its posterior wall, the perineum was closed by sutures, a rubber tube and a strip of gauze protruding from the anus. The rubber tube led into the lower end of the rectum and from here forward and upward into the sigmoid and colon. The strip of gauze lay behind the rubber tube in the lower part

of the rectum and then went up into the original rectum and sigmoid, covering the ulcerated surfaces. The function of the original rectum and sigmoid was to be performed by the descended sigmoid and colon, the feces escaping through a sort of short cut, while the original rectum and sigmoid were switched off and were expected to become atrophied, much in the same way as other portions of the colon eliminated after the method of v. Eiselberg, Obalinsky, Hacker, and others.

The convalesence was comparatively uneventful. The sphincter healed incompletely, as the repeated spontaneous expulsion and subsequent reinsertion of the rubber tube was too much of a strain on the sutures. There was some suppuration of the perineum and rise of temperature as high as 104 degrees on two days before the collodion dressing of the abdominal incision was removed, under which some stitch abscesses had formed. Nevertheless the patient was able to leave the hospital nineteen days after the operation, and she has continued to improve since then. She gained 35 pounds in five months and was able to do her work two months after the operation. Five months after the operation she reported that her bowels moved once or twice daily, that there was no incontinence, and that she did not have to use any laxatives. An examination at that time showed that the new rectum admitted one finger easily. The old rectum had shrunk so that the finger could not enter it. It secreted a small quantity of mucus, which appeared only at the time of the daily evacuation. The patient was put under antisyphilitic treatment in order to prevent renewed syphilitic affection of the parts.

Now, about one month ago, over five years after the operation the patient has been seen again. She now weighs 140 pounds, that it to say, has gained 58 pounds since the operation. She has daily natural passages, there is no more discharge of mucus, and the patient has no incontinence.

I take this occasion to report the case, because reports of such cases observed for years subsequent to the operation are somewhat scarce, and are of the greatest importance when it comes to judging the value of different methods.

Since I have performed this operation, J. Rotter, of Berlin, has published three cases of an operation which he calls "sigmoideorectostomy." His publication appeared in the *Archiv fur klinische Chirurgie*, Vol lviii., 1899. His first

paper was read May 13, 1898. His first patient was operated upon on July 25, 1897, about one month after my first operation, and before I had published anything about my operation. However, his operation is in all essential features identical with mine. Two of his patients have recovered; one died of peritonitis. In the two cases in which the patients recovered, and which were reported fifteen and six months, respectively, after operation, the switched off bowel had not healed completely and continued to discharge some mucus. He therefore considers the resection of the rectum to be the preferable procedure where feasible, but regards the sigmoideorectostomy as superior to proctotomy or colostomy. He objects to Bacon's operation on account of the danger inherent in the button, when employed in the large intestine, and thinks the operation useful only in strictures located above the cul-de-sac.

In conclusion, therefore, we find a place for the sigmoid-oproctostomy in cases in which an end-to-end anastomosis or Bacon's side-to-side anastomosis would be impossible and in which an artificial anus would formerly have been considered the sole hope of the patient.

DISCUSSION OF PAPERS BY DRS. SUTTON AND RIES.

Dr. John L. Jelks, Memphis.—I have never done much of this sort of work and my reason for declining to do it, and I think it is justifiable, is that the results have been so unsatisfactory. It is true that this man or that man may report a few successful cases out of several operated on and he might give very good percentages of recovery.

With reference to cancer of the rectum, it is my belief that usually these growths have become too extensive and the involvement of the lymphatics too great to hope for success in the ultimate outcome.

In regard to the second class of cases, that of stricture of the rectum due to syphilis, I think this operation is justifiable and for one, I want to commend the essayist upon the good results as cited in his paper. It is in this class of cases that the profession of medicine has better results than heretofore. I believe that the progress of surgery is such that ere long we will have better results than have ever been obtained heretofore. Syphilitic stricture of the rectum grows so in-

sidiously that in a great many cases there is an apparent good hope of success by means which are not so radical. For example, in the beginning of stricture, so far as I have found (and I have examined a great many cases), all the cases of syphilitic stricture of the rectum seen in the early stages have for their starting point in the plicae transversalis recti. If seen early and the operation is then performed, it is devoid of danger and has a hope of permanent result.

DR. SUTTON, in closing.—Whether the operation for cancer of the rectum is justifiable or not the condition of these patients is very deplorable when they come to us. They are usually inoperable. Prof. Senn says that eight out of ten cases are inoperable. But, on the other hand, cancer of the rectum gives better results following operation than in any other part of the body, if done early. We must not forget the results of Hochenegg, who collected 174 cases, with 30 per cent. of cures. If the last speaker had his way, there would not be this 30 per cent. of cures. Cancer is a formidable disease, and requires radical procedure. Cancer of the vagina is more formidable and surgical procedure is equally justifiable, for it results in the prolonging of life from nine to fifteen years, as the cases reported by Hochenegg show.

IX.—THE EARLY DIAGNOSIS AND CONSERVATIVE TREATMENT OF FIBRO-MYOMATOUS TUMORS OF THE UTERUS.

BY L. G. BOWERS, M. D.,

RICHMOND, IND.

My reasons for presenting a paper on this subject are not that I have anything especially new to proclaim, but to emphasize some parts of this field of work which it seems to me have been neglected to some extent in previous essays, advocating surgical treatment. I refer especially to the early symptoms and diagnosis, and to some phases of treatment.

As a rule, the general practitioner has the case in charge first. It depends many times on his diagnostic acumen for an early diagnosis, and this determines, in a large per cent. of the cases, the nature of the treatment, or the remedial measures to be pursued.

We admit that a large number of women have had these tumors for years without any symptoms calling for treatment, and are found accidentally while examining for other supposed conditions. But there are quite a number of other patients that have more or less pronounced symptoms from the first, and it is to this class of cases that I specially refer.

In reviewing the recent literature of uterine fibroids, I find but little attention paid to the symptomatology and diagnosis, in fact nearly everything connected with the subject is an embodiment of the operative views and criticisms of the authors, these contributions giving us little information that will enable us to prevent the more radical operation of hysterectomy.

It is easy for any one to make a diagnosis when a polypus appears at the external os or the uterus becomes so large as to fill the pelvis, but what is the condition of the patient now? She may be bloodless, and very probably has been an invalid for months or years.

The early symptoms of these growths are sometimes obscure; consisting of a little increased hemorrhage and pain at menstrual epoch. Later, the hemorrhage lasts longer and the interval shortens between periods. The patient now becomes easily exhausted and anemic. Again the physician is called to treat a case of sterility without a discoverable cause on superficial examination; or to treat repeated miscarriages without knowing that which produces them.

The writer came near losing a case of twin miscarriage in a primipara from hemorrhage due to a polypus. This case had a severe post partum hemorrhage one hour after delivery, which was discovered and stopped when she was nearly exsanguinated. She seemed to have recovered nicely, and had been up in her room for several days. On the twenty-first day I was called hurriedly to see her, and found she had bled profusely from the uterus and was lying nearly pulseless on the bed. I applied restoratives and packed uterus temporarily with gauze; later, dilated cervix and removed a polypus about two inches long, uterine in shape, with an opening in fundus large enough to introduce my little finger.

This, of course, was the cause of the miscarriage and hemorrhage.

Sometimes a supposed case of sciatica is treated uselessly for months, when a careful examination would reveal the real condition to be due to pressure by a fibroid.

The unguarded physician may attribute some of the above symptoms to "cold," or to an early miscarriage, when, many times, they are due to these growths.

The writer insists that when a woman has had unusual hemorrhage for a few menstrual periods, without any apparent cause, it is our duty to prepare them for curettage, and they can be thoroughly examined while under an anaesthetic; and then, if polypus exist, it can be removed, and the cavity curetted and packed with gauze.

To examine a patient, they should have their bowels first emptied, by an enema; then catch the lower lip of cervix with a volcella and have an assistant pull downward; place left hand over abdomen and introduce index finger of right hand into rectum. In this way you can detect resisting points of tumors high up on uterus when they are yet very small.

The relations of the growths to cervix or body of uterus can best be determined by examinations through the vagina.

As I have already indicated in the beginning of this paper, we will speak of some of the phases of treatment.

Early in these cases I believe the animal extracts deserve a trial, especially the thyroid extracts.

There are many other drugs which have been used seemingly with success at first, but later dropped by the wayside.

Besides ergot, whose use is well known, hydrastin has given me the best results; I prescribe it to be taken three times a day. It must be given for some time to reduce the menstrual flow materially.

The galvanic current may relieve the pain and hemorrhage in some cases. It must be applied once each week for two or three months to get any results.

Curettement should be the first surgical treatment to be

considered. When performed early it saves the patient long periods of wasting, with the attendant loss of strength, and while the patient is under an anesthetic, as before stated. we can make a more thorough examination. While on the other hand, if curettement is left until late, relatively speaking, besides the loss of vitality which the patient suffers, the pathological changes in the uterine cavity may be such that there is danger to the patient in such a surgical procedure.

The indications for myomectomy, given by most surgeons, are severe hemorrhage, when tumors complicate pregnancy, pressure, twisting of pedicle, degenerations of the growths, sometimes to relieve mental distress, etc.

It seems to me that in this day of good surgical technique, and when the highest ideal of surgery is to restore to normal and not to remove as a last resort, that we are justified in an early operation, before severe hemorrhage exists, and without other urgent symptoms, especially in a patient below thirty-five years of age, for the following reasons:

First—It may relieve her from future probability of a Cæsarean section.

Second—It may save her from a more radical operation, hence less "mutilation."

Third—The operation can be done when the resistance of the patient is at the best; as a result the mortality is lessened.

Fourth—There will be no danger from degenerative changes.

Fifth—If excision is delayed until tumors become large, there may be a rupture of uterus, if pregnancy should occur.

Sixth—It is a great mental relief to the patient.

Seventh—It is performed before there is any degenerative changes in the blood vessels, which sometimes is a result of this condition. This latter, in my opinion, should be given no little consideration. I have in mind a case of death that occurred lately on the table, which, I believe, was the result of these vascular changes.

Eighth—When operated on early, we can usually save the uterus, and therefore the patient from much mental distress.

I never had this last indication for conservative surgery

brought so forcibly to my mind as recently. And as it impressed me so in favor of conservative surgery, I will recite briefly the incident.

I performed an operation on a prominent lady of our city, who was very solicitous at first about her friends not knowing about her condition. After her arrival at the hospital she requested the matron, as a special favor, to not let any one know what was done to her. About ten days after the operation, she again requested the matron, as a special favor, to tell everyone who asked her the exact nature of the operation, so they would not think she had lost her uterus.

Myomectomy should be the operation of choice in all cases where there is a reasonable ground for success.

As to vaginal or abdominal route, I think it depends on the individual operator, and his habit and training, as to the one that will give the best results, with the least mortality. But I do believe the abdominal route furnishes a few advantages over the vaginal; such as being in direct touch with the diseased organ, one can eneucleate the tumors with less tearing of the uterus, and one will be in position to examine and remove appendages if necessary.

The next operation of election should be hystero-myomectomy. By this method we can preserve the length of the vagina, and we do not open up this avenue to infection of the peritoneal cavity, and one can also say to his patient, "It was not necessary to remove *all* of the uterus."

The one possible objection to this procedure is that carcinoma may develop in the amputation scar.

In conclusion, let us again urge that more be written on early symptoms and a disagnosis for the special benefit of the busy general practitioner.

I hope that in the future, with earlier diagnosis and with improved technique, that in selected cases we will have more restorative and fewer mutilating operations.

DISCUSSION.

Dr. H. C. Frick, Kansas City, Mo.—The treatment of fibroid, in my opinion, is surgical and the least surgery possible is indicated.

DR. BOWERS, in closing.—In referring to hemorrhage as a symptom, I spoke of it as one of the symptoms. I believe that purely submucous polyps rarely give any symptoms. I spoke of the abdominal examination and stated that we could usually detect fibroid, and that where we have an interstitial polypus we will usually have bleeding.

X.—CYSTS OF THE MESENTERY; REPORT OF CASE, OPERATION, RECOVERY.

BY HERMAN E. PEARSE, M. D.,
KANSAS CITY, MO.

Cysts of the mesentery are exceedingly rare, there being about fifty cases of operation for this condition recorded in the world's literature. *Braquehaye made a full and careful study of these growths and reported the result of his labors in 1892. He gave a classification of the growths under five heads.

1. Traumatic cysts of the mesentery. These consist of areas of hemorrhage from broken blood vessels. There is always blood in a traumatic cyst or serum and remains of a clot. The traumatic cyst is essentially a hematoma.

2. Lymphatic cysts of the mesentery or cysts containing chyle are the most frequently found; they may originate in a lymph gland or in any lymph vessel. The contents consist of a white fluid—chyle—containing albumen and globules of fat. It is made clear by shaking with ether. Traumatism plays a prominent part in the formation of chylous cysts. The site is oftener a lymph gland than a dilated vessel.

3. Dermoid cysts may be found in the mesentery. They are congenital and known by their contents, teeth, hair, bone, etc., and by traces of dermic structure in the lining.

4. Hydatid cysts, or parasitic cysts. These may and do lie between the layers of the mesentery as well as anywhere else in the body.

5. Cysts of other organs may force their way between the layers of the mesentary and come under this classification.

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*Greg Smith's Abdominal Surgery, Vol. II.

The diagnosis of these cysts is of importance as affecting the question of removal or prognosis. All such cysts should be removed by operation, but in advising their removal the surgeon cannot give such a favorable prognosis as is possible in the case of ovarian cysts.

In diagnosis of these, as of all abdominal tumors, we must proceed in an orderly manner, and by pursuing a course of intelligent classification of symptoms and conditions we achieve that clear and definite diagnosis so much coveted, and which alone gives us the confidence of our own convictions.

The following procedure is one always safe to follow. I took it a few years ago from the book of that master of surgery, Greig Smith, surgeon to the Bristol Royal Infirmary. I know of none better. I have followed it in my clinic for two years with perfect satisfaction.

1. Exclude the following conditions *carefully*:

(a) Distended bladder; (b) fecal accumulation; (c) phantom tumor—pseudocyesis; (d) obesity of abdominal wall; (e) obesity of omentum; (f) tympanites; (g) edema of the abdominal wall.

The last two can but seldom prove hard or troublesome.

Having demonstrated that there is a tumor of the abdomen we next ascertain,—

2. The great fundamental fact of consistence. Is the tumor solid or cystic? This determined, we ask,—

3. Is the tumor in the median line or to one side? i. e., is it symmetrical or non-symmetrical?

4. If symmertical, is it in the upper abdomen, or lower abdomen? If non-symmetrical, consider right side tumors, left side tumors, and either side tumors. By this means we increase our knowledge of the tumor two-fold, four-fold, eight-fold, by each successive elimination and classification. By this means these cysts can be pretty certainly classified and diagnosed in advance of operation.

The case I have to report is as follows: Mr. C., a blacksmith, age 38 years, came to me, with his physician, Dr. Rhoades, on May 19, 1902. He had an abdominal tumor

that has lately interfered seriously with his work from its size. Moreover, he has recently suffered several severe attacks of cramps from bowel occlusion, which had been so severe as, in his opinion, to threaten his life. Examination showed a powerful man, about five feet nine inches in height, with the muscular development that belongs to one who works at the forge and anvil. It had been his boast that he could shoe any horse, however unruly, that came to his shop. The tumor answered the first consideration by enabling us to eliminate all the pseudo tumors named. It was a true tumor of the abdomen. Proposition two was equally positive; it was a cystic tumor. Proposition three was positive in that the tumor, while lying in the middle line, at times showed a constant tendency to move to the right side and to the upper abdomen. This eliminated both kidneys, urachus, gall bladder, spleen, and left us to consider only cystic sarcoma of omenteum, tuberculosis of peritoneum and mesenteric cysts. Of these the first seemed most probable, owing to the patient's age, the rapid growth of the tumor and lack of constitutional signs of general disease. A zone of typanites always showed between it and the pubic bone, and I was sure that the large intestine was always to be found surrounding the tumor: i. e., that it lay within the circle of the large intestine. The tumor appeared bean or kidney shaped, nodular, sharply fluctuating in its long diameter, not in its short diameter, about eight to ten inches long by three inches thick and four inches wide. It could be carried under the ribs on the right side.

Careful blood examination by Dr. Newton McVey showed nothing to clear up the diagnosis. Operation was decided upon and done at the Woman's Hospital, May 23rd, 1902, Drs. McVey, Rhoades, Samuel Ayers and Merwin being present. After opening the abdomen under the usual cleanliness the tumor was delivered, together with a large portion of the small intestine. It was then seen that the tumor lay upon the mesentery of the ilium. This it had not split evenly, but had peritoneal covering with small vessels on the inner side, while most of the larger mesenteric vessels were upon the outer aspect of the growth. I was convinced of my ability to remove it, although such cysts are generally treated by incision and drainage after fastening the cyst wall to the abdominal wall. Accordingly, I carefully cut down through the peritoneum, avoiding, where possible, vessels leading to the gut, pushing them aside or lifting them with the peri-

toneal coverings. There seemed to be no adhesions whatever; the growth seemed a dilated lymph gland, filled with chyle, and to have escaped periadenitis. After much careful blunt dissection the growth was removed and blood supply to the bowel was not imperiled. The peritoneum was smoothly closed up in a T-shape, so that the edges were approximately without tension; the abdomen was closed without drainage, and the man put to bed. There was some nausea, but no vomiting. The temperature never rose over 99.8 degrees F., and there has been no signs of recurrent trouble.

The cyst wall and the cyst contents were carefully analyzed by Dr. Newton McVey, who reported as follows:

"Upon examination of cyst of abdomen, I find the contents are fluid and consist of chyle. Cyst wall from one-eighth to one-fourth inch thick, and composed of peritoneum, connective tissue and epithelium. It is a pure chylous cyst."

XI.—ABDOMINAL SECTION FOLLOWING SO-CALLED "VAGINAL PUNCTURE," WITH REPORT OF CASES.

BY JOHN YOUNG BROWN, M. D.,

ST. LOUIS, MO.

An extensive operative experience has convinced me that in a large majority of cases of pus in the pelvis the condition can be dealt with more satisfactorily through a supra pubic incision. Through this incision radical and complete work can be done; bowel, bladder and omental adhesions can be properly handled; and the appendix, which is frequently involved in such cases, can be removed. In other words, the supra pubic operation enables the surgeon to do thorough work under the guidance of the eye, and is the operation of election in a large percentage of cases. It is not my purpose to discuss in this paper the relative merits of the vaginal and abdominal routes in dealing with puriform diseases of the uterus and its adnexa. Both methods have their advocates, and while I am wedded to the abdominal route, believing it to be the only method by which we can do complete surgery, the vagina affords simple and easy access to pelvic

pus collection in a selected variety of cases in which an approach from above would be hazardous.

Within the last eighteen months I have operated sixteen times by simple vaginal section and drainage. All of these patients at the time of operation were profoundly septic, with rapid pulse, leaky skin and large pus sacks low in the pelvis —many of them too ill to remove to a hospital. All were treated by free, wide, posterior vaginal section and drainage. Of the sixteen cases, nine fully recovered, two are still under treatment. Five have since been operated on from above—with radical removal of tubes and ovaries, and in three the appendix—four by myself and one by Dr. Joseph Price, of Philadelphia. These cases present an interesting series, and they demonstrate at once the value of the drainage operation, not only as a curative, but as a palliative procedure, for not one of the cases here reported, on whom the radical operation was subsequently performed, could have survived a primary abdominal section. The mortality following abdominal section in such cases is from 15 to 25 per cent. The mortality following drainage is less than 2 per cent.; and while many of them, treated by the latter method, must necessarily undergo a second operation after they have recovered from the acute sepsis, we can but admit that two operations with a live and cured patient as a result is better than one operation from which the patient dies. Those who advocate the treatment of all pelvic pus collections from above frequently refer to vaginal section as "vaginal puncture." This is unjust, as no one would think of making a puncture into a large abscess. In dealing with pus here, as in other parts of the body, the incision should be free, sufficient to introduce two fingers and large enough to admit of the introduction of a good sized drain. The following cases I beg leave to report:

CASE I. Blanche P., age 30, mother of three children, youngest two years old. Six weeks prior to my seeing her, she had had an abortion at the eighth week. Since that time she had gradually grown worse, and when seen by me was pale, profoundly septic, pulse 128, temperature 103½. On

examination, I found a huge fluctuating mass behind the uterus, extending well above the brim of the pelvis into right iliac fossa. After cleaning the patient up she was placed upon the table and a free opening made into the cul-de-sac, about two quarts of pus was evacuated, the cavity was washed out and a gauze drain placed. Improvement was rapid, acute symptoms quickly subsided, fistula and discharge persisted, with mass on right side and considerable thickening in region of appendix. Eight weeks after primary operation I opened the abdomen, removed both tubes and ovaries, and the appendix, which was buried in a mass of adhesions with right tube. The patient made an uninterrupted recovery and is now in good health.

CASE 2. Minnie K., age 19, single. History of gonorrhea. Five weeks prior to my seeing her she was curetted, which operation was followed by a violent pelvic peritonitis. When seen by me she was pale, emaciated, with pulse rapid, abdomen distended and skin leaky. On examination, I found a large mass behind the uterus, fluctuation well marked. The vaginal section evacuated about a half a pint of pus. She improved slowly, uterus remained fixed, with mass on both sides. Two months after primary operation I enucleated both tubes and ovaries. Large tubo-ovarian abscess on right side, appendix six inches long, tightly adherent and badly disorganized. Recovery followed and patient is now in good health.

CASE 3. Mrs. K., age 32. When seen by me she had been ill for five weeks following what was supposed to have been an abortion, for which she was at the time curetted. Her condition was pitiable; she presented the usual picture of profound sepsis. A large fluctuating mass, to the left and behind the uterus, was widely incised, evacuating the contents of a suppurating pelvic hematocele. The improvement in the case was marked and immediate. She rapidly gained strength. Her pelvic trouble, however, persisted, and nine weeks after the drainage operation I opened the abdomen, enucleating both sides, with the appendix, which was sufficiently diseased to warrant its removal.

CASE 4. M. H., age 22. Had gonorrhea one year ago. She had had repeated attacks of pelvic peritonitis, had been curetted twice, the last curettement having been done two weeks prior to my seeing her. I found her septic and leaking. A large mass, pointing in Douglas cul-de-sac, incised and drained, but sac refilled, necessitating dilatation and fre-

quent washing. I opened abdomen three weeks after the operation and found bowel, omental and bladder adhesion. I removed both sides. The recovery was slow, but progressive, and the patient is now in good health.

The case operated on by Dr. Price, of Philadelphia, presented a history very like the ones above reported. She had been for several years the victim of frequent gynecological abuses, including the use of the curette and the application of caustic to endometrium. Dr. A. V. L. Brokaw, of this city, saw her in consultation with me, and we agreed that a primary section was out of the question, the patient being profoundly septic with a huge fluctuating mass low in the pelvis. She was freely incised, and improvement was rapid. Several months afterward, while in the East, she was again taken ill. I referred her to Price, who did a radical operation, removing both sides, with the appendix. She is now in excellent health.

An analysis of the histories and pathological findings in the cases above reported is interesting. It shows the frequency in which the appendix is involved in cases presenting pelvic lesions. This is a strong argument against the method which proposes to radically deal with cases of this character through the vagina. 2. It shows the futility of attempting the cure of cases of gonorrhoeal origin by any method short of radical supra pubic enucleation. 3. It illustrates the danger of the curette when there is involvement of the tubes, unless the curettement immediately precedes the radical operation. Some of the worst cases of pelvic peritonitis it has ever been my misfortune to deal with, have come with a history of curettement.

In conclusion, I wish to say that my purpose in bringing this subject before the society has been with the hope that my remarks would cause a discussion of this important subject, and also to take issue with those who contend that the drainage operation has no place in pelvic surgery.

DISCUSSION.

DR. A. M. HAYDEN, Evansville, Ind.—Dr. Brown's experience corresponds with my experience in similar cases. I call to mind a case in which vaginal section was made for drainage of pus cysts in the pelvis six weeks prior to the

time when she came to me. I diagnosed a large fibroid and made abdominal section. I found cysts containing five or six pints of pus, leaving a fistulous opening connecting the vaginal wall and posterior cul-de-sac. In the last week or two I saw a case of pus in the pelvis which I am satisfied if I had attempted to make abdominal section to remove the cyst the patient would have died. She came with a rapid pulse, high temperature and all the symptoms indicating approaching collapse. In this case, by making vaginal incision, the patient got well in a very short time. I had one case, however, die within a few hours after the incision. There are other cases of pus in the pelvic cavity of gonorrheal origin, which cannot be cured or even drained in the vagina. I have attempted to make drainage in a good many of such cases, and drained out, as I thought, all of the pus, but afterwards found other lesions. Another point I have found in my experience, is that quite frequently we have the appendix involved and in an inflammatory condition. Where we have pus in the pelvic cavity of long standing, we frequently find the appendix more or less diseased.

Dr. C. Lester Hall, Kansas City.—I endorse Dr. Brown's paper very fully, though when he speaks of vaginal incision, I hope he doesn't mean just what he says. From my point of view, I believe the Henrotin method of opening the pelvic cavity posteriorly is hardly worthy the name of incision. The incision is made through the mucous membrane only, simply to admit a dissector, and the index finger is the best instrument. That is the Henrotin method of dealing with a pelvic abscess, and it is vastly superior to the trochar, which the essayist condemns, and even superior to what has been denominated incision. With this dissecting method we can go very much higher and very much safer than we can with a sharp instrument.

Dr. Brown is to be commended in disapproving the habit of some surgeons in curetting the uterus when the organs are in such a condition as we often find them, when a pelvic exudation exists. There is no question but that this operation often lights up an acute inflammatory condition demanding an abdominal operation or at least endangering the patient's life. It certainly is wrong to curette the uterus when it is in a fixed position and surrounded by an inflammatory mass. Dr. Brown's method of dealing with these cases is eminently proper. I am convinced that if we will keep the drainage open a sufficient length of time many of

these cases of vaginal drainage will become permanently well. It is the most practical route of reaching the pus cavity and is in the direction of the natural way of eliminating poisons from the system. I believe that many of these cases, where the opening is made free and the packing maintained for a sufficient length of time will recover, without subsequent abdominal section.

DR. A. H. CORDIER, Kansas City, Mo.—I am sorry I did not hear the paper, but the whole question of opening these inflammatory and suppurative processes in the pelvis resolves itself primaritly into a question of diagnosis as to the variety of the infection and the location, of course taking into consideration the position in some of these cases.

With an abscess in the pelvis, retro-peritoneal or the result of some infection following labor, the infection taking place between the ligament and the broad ligament, operating through the abdomen would be folly. All that is necessary is to open through the vagina and drain and if the patient does not die from the sepsis from which she is suffering, she will recover in nearly all cases.

The diagnosis of abscess is based principally upon the absence of peritonitis. A large suppurative process may be retro-peritoneal and develop in this location without any evidence of a localized peritonitis. Hence we make the diagnosis by the symptoms found on examination with the finger and the absence of the usual symptoms indicating that we have an affection in the broad ligament, and then the only thing to do is to drain.

There is another condition in which we have a large abscess forming with the apex down in the cul-de-sac. The mass is well defined with a localized peritonitis and a history of having had previous attacks of inflammatory trouble connected with the tubes and ovaries. In these cases we are compelled to open the vagina, but they go on suppurating, probably not becoming obliterated. Occasionally we have one of these cases remain well permanently.

There is still another class of cases having symptoms of pus existing for months or a year, with recurrences and if we drain we will find a shaggy pus cavity looking like the hull of a cocoon. We do not expect to cure these cases by the vaginal opening—this is done simply to obtain temporary relief, and the abdominal incision is necessary for a complete cure.

In regard to the opening. In many cases the constitutional symptoms are absent at the time we see the case, and one of

the dangers following the operation, and it is the principal danger, is the opening up of a fresh wound, thus affording a new surface for absorption. To obviate this, I use the Paquelin cautery. By this method we shut off the possibility of pus passing over the surface of the wound being absorbed until the granulating surface heals. A granulating surface is not likely to absorb matter passing over it. Then sometimes the opening in the vagina is closed too early. I never pack, but I keep the tubular drain in until it is forced out by nature's efforts to obliterate the sac. By this method I believe I get the best results in the majority of cases.

Dr. Brown, in closing.—I have never done a vaginal section in a case where I felt it was justifiable to do the abdominal section. Only those cases, those desperately septic cases, where it is hazardous to go in from above, do I think should be entered in this way. Whenever I find a patient desperately septic and I can reach the trouble through a simple section of the vagina and drain out, I do so and pay particular attention to building up the patient. Then later we can go in from above and do what radical work is necessary.

My experience in dealing with cases of this character is that a certain proportion of those of puerperal origin can be drained out and the majority will get well. In cases of gonorrheal origin, and especially where there is a history of previous trouble, with the pus sac opening into Douglas' pouch, I have never done the operation with the idea of curing the patient—it was simply a palliative measure to be followed subsequently by the radical operation. The vaginal work I have done has been limited to vaginal section, except in cases of cancer of the uterus. I don't believe we should ever treat a case of pus in the pelvis in this way unless we are unable to reach it through the abdomen.

My convictions are based entirely on the pathological findings in regard to the suprapubic section. In a great many instances we have involved the appendages as well as the ovaries, and troubles that cannot possibly be dealt with except by the suprapubic incision. It would be impossible to treat such conditions from below.

There is another point I would like to emphasize, a point which I believe every gynecologist will support, and that is a protest against the indiscriminate use of the curette. It is my experience that some of these violent cases of pelvic peritonitis come to us with a history of one or two curettements. Unless the curettement is to be succeeded by the radical operation, nothing can be gained where we have adherent tubes.

XIII.—A PLEA FOR THE ABANDONMENT OF THE ABDOMINAL BELT AFTER CELIOTOMY.

BY MAURICE KAHN, M. D.,

LEADVILLE, COLO.

A few quotations are inserted as evidence of the prevailing opinon regarding the use of the abdominal belt, as attestation that I am not unmindful of the possible furore that the expression of my opinion may excite. And it is with a full knowledge of this possibility that I venture to depart from the orthodox belief:

"Before the patient is permitted to get out of bed she should be furnished with an abdominal bandage, which not only will tend to prevent any opening of the incision, which might be followed by a hernia, but will also add a great deal to the patient's comfort by supporting the abdominal walls. This bandage should be used for from six months to a year." —HUNTER ROBB, "Aseptic Surgical Technique."

"A protective abdominal binder should be worn for at least six months thereafter." (Abdominal Section.)—American Text Book of Surgery.

"* * * The patient is directed to wear an abdominal supporter for several months after he has left his bed."

"Four weeks in bed and the wearing of a well-fitting abdominal support for from three to six months are the most reliable precautions against the occurrence of a post-operative vertral hernia."—SENN, "Practical Surgery."

"For six months or a year after the operation an abdominal binder should be worn, at the end of which time it may gradually be dispensed with."—"An American Text Book of Gynecology.

"An elastic abdominal belt * * * is used during the first year after laparotomy to take off the strain on the cicatrix."—GARRIGUES, "Diseases of Women."

"The value of abdominal bandages to prevent hernia has been greatly overestimated. I advise their use only in fat women, or where the abdominal wall is exceedingly lax and the muscles atrophic; where they are necessary they should

be worn for from six months to a year."—HOWARD KELLY, "Operative Gynecology." I take issue with Dr. Kelly on the necessity at any time of using an abdominal bandage to prevent hernia. The more lax the walls are the more do they need developing and the greater the indication for not using a support; and I would call attention to what I consider of much more importance in the prevention of hernia than the binder, and that is correctly placed fascia sutures. I may add that I should not experience any solicitude if the abdominal wall were sutured by Dr. Kelly's own method.

"No binder or other abdominal support need be worn after complete healing of the abdominal wound has been secured. Care should be taken that no undue strain is brought to bear upon the parts for several months. If the patient is compelled to undertake a laborious occupation before this time he should wear an abdominal support."—FOWLER, "A Treatise on Appendicitis." I should suggest gradual development of abdominal muscles to meet the exigencies of the laborious occupation, as applied to the individual case.

With one exception, I have been unable to find any expression of my own conviction. That exception is the opinion held by Professor Olshausen, of Berlin, as stated by Professor Senn in "American Medicine," 19th July, 1902. Dr. Senn says:

"Prof. Olshausen is of the opinion that ventral hernia after laparotomy only occurs when the fascia, from faulty suturing or suppuration, fails to unite. He has no confidence in abdominal supporters of this post-operative complication."

Coming as it does from so high an authority it merits and demands a consideration which the same theory could not command if promulgated by a less brilliant star in the surgical firmament.

The universal practice of prescribing the abdominal belt after celiotomy as a supposed preventive of hernia seems to me to be the result, partly of irrational reasoning, interspersed, perhaps, with a circular philosophy, and partly to the human proclivity to thoughtlessly follow without knowing why, the practice and precepts of others. If I but succeed

in arousing some discussion of this subject, or if I only succeed in directing some thought along these lines, even though I do not convince your honorable body that the fallacious theory which invites the confidence reposed in the efficacy of the post-operative binder, is a modern Scylla, this paper shall have achieved the purpose of its writer. For if in consequence sufficient interest is aroused in the subject, I firmly believe that it will be but a short time when the post-operative abdominal belt will be obsolescent.

The anatomy of the abdominal parietes is doubtless sufficiently well comprehended to not require its rehearsal except perhaps to call attention to the direction of the muscle fibers. It will be remembered that the fibers of the muscles and fascia intersect each other at angles varying from about twenty-five to ninety degrees. By reason of a common nerve supply the large muscles of the abdominal wall act synchronously. This has a bearing on a point to be made presently.

In performing an abdominal section our purpose should be to have an incision so directed that after closure of the wound the contraction of the muscles themselves will tend to safeguard against hernia and not conduce to its formation. The excellent cancellated arrangement of the fibers of both muscles and fascia makes this easily accomplished. It follows, then, that the most rational method of gaining entry to the abdomen, and one of first importance, is by the so-called "muscle splitting" or "gridiron" operation, i. e., splitting the muscle parallel with the direction of its fibers rather than the "cross cut" or "straight through" operation.

It must be perspicuous, then, that as the muscles act simultaneously and as each muscle in contracting and shortening its fibers diminishes the size of the opening, in a direction parallel with its own long axis, the result is a diminution in the size of the opening that is not limited to one direction, but is general; and further, the more strenuous the contraction the greater the diminution in the size of the opening, and the more securely it is closed the less the liability to hernia. The reverse would obtain in the cutting technique where the fibers are severed transversely instead of longitudi-

nally, if it were not for efficient suturing. And I believe the straight through technique to be the most effective factor in subverting an ideal result in most cases, not so much because the muscles are cut transversely, but because of inaccurate and careless suturing afterwards. I may say here that I am not indulgent to the use of the belt after the straight through incision and condemn its use as vehemently as I do after the muscle splitting operation, for even in the straight through operation, if the deep sutures are securely and correctly inserted, they will effectually retain in approximation the two edges of the fascia. If it is true that the more forcefully the muscles contract the greater the safety against hernia, then are we to be considered less clever than the veriest tyro in athletics? If the athlete desires muscular development, does he bind up his arms and legs for a few months and then expect to be able to withstand the strain of a contest? However, it is unnecessary to give illustrations of so universal a truism as: To exercise muscle is to develop muscle.

Then why not adopt nature's suggestion and strengthen the muscles where they require it, by development—by giving them not only their ordinary task to perform, but impose on them an excess of labor? This is certainly a safer and more reasonable procedure than the one generally adopted of relieving them of the work they are accustomed to perform by applying an abdominal belt, which, if tight enough to exert any influence, must relieve the muscles of their usual labor; the result being that we have supervening the atrophy of non-use, whereas it would be desirable to have the hypertrophy of overuse. Then when the time arrives for the belt to be discarded we have muscles unaccustomed to executing all the work alone (having been assisted by the belt); in short, attenuated muscles suddenly summoned to accomplish what is relatively an excess of labor, or actually a normal labor with a subnormal ability. Why permit the muscles to atrophy at all? Why not insist on their doing their work without intermission as has been their habit? Let us suppose a case in which some operation has been performed on the posterior tibial nerve, high. Is there a suregon present

who would, even while suffering from an attack of incubus, put that leg in plaster for the purpose of preventing an aneurism of the posterior tibial artery? And yet the cases are not wholly dissimilar.

There are doubtless some who will maintain that the abdominal belt is harmless anyway, and should be worn as a possible safeguard. Let me reply to these that even if this were true, which it is not, as has been pointed out in the foregoing, the bother of applying it and the inconvenience of wearing it are not merely fanciful objections to its use.

If it were possible to apply a belt internal to the abdominal wall it might perhaps be of service in giving the cut edges of the fascia an opportunity to firmly unite before any strain were imposed upon it, but even so the muscles would be atrophying the while. Nevertheless, this might not be an unwise procedure, whereas such argument cannot be advanced in favor of the ordinary external abdominal belt, which will not prevent the exertion of pressure on structures internal to itself.

It has been my practice for over three years, including one case operated at the second month of pregnancy which carried to term ("Removal of Ovarian Cyst, Broad Ligament Cysts and Appendix at the Second Month of Pregnancy. Delivery at term." American Medicine, July, 1901.), after removing the first dressing, which is applied snugly for comfort, to allow patients to go without any support. This dressing is usually removed three or four days after the patient is up and around—sixteen or eighteen days after operation—and I have had no occasion to regret the practice that may appear to some to be an indiscreet radicalism, but which I am convinced is an eminently circumspect conservatism.

In closing, I should say: Suture accurately and securely, abandon the belt, develop the muscles where necessary and avoid hernia.

DISCUSSION.

Dr. Emil Ries, Chicago.—Here we have a young man from Colorado—from out West—coming and telling us to abandon the abdominal belt after laparotomy. Was ever

such heresy heard of! We are always expecting something new from the West, and when I saw this title on the program, I expected to hear just what the doctor has said, and because I am very much interested in this question, I came here to listen to the paper. And because none of the older gentlemen who have been doing laparotomies for years and have been using the belt, have said anything, I want to say that I think the essayist is right, and I have been doing the same thing.

At the meeting of the Am. Med. Ass. in 1899, I read a paper on the after treatment of cases of celiotomy. In this paper I reported my treatment after laparotomy, and I go a good step further than Dr. Kahn. I allow them to get out of bed the first twenty-four hours; and in the second twenty-four hours, if the general condition permits it, I have the patient sit up and walk, and from that time on they are out of bed as much as they like. My vaginal hysterectomy cases go home any time from six days to a week after the operation; my laparotomy cases go home any time from ten to fifteen days after the operation. Of course, suppurating cases cannot go home. After the dressings and stitches are removed they wear nothing—they have the scar and nothing else. I have offered a premium of $500 on every case of hernia shown me following this treatment. Nobody has claimed it yet. I have followed this method for six years. As the essayist has said, if we suture properly and have asepsis we need no belt.

Dr. Emory Lanphear, St. Louis.—From my point of view no discussion is possible on this subject. I have not used the abdominal belt for years except in those few cases where I was compelled to close with the through-and-through suture advocated by Joseph Price; and in cases where there was suppuration of the abdominal wall; or where I knew the patient would not follow my directions and would put on a corset. Those are the only three classes of cases where I put on an abdominal belt. I am like Dr. Ries, since adopting (some twelve or fifteen years ago), the method of closing the abdominal wall by first suturing the peritoneum and then suturing the fascia and finally the skin separately, I have never had hernia. The chief thing with a woman is to keep her from putting on a corset for a year after the operation, and then she will do without it for the rest of her life, if she has good sense.

XIV.—RENAL CALCULI, OR HEPATIC CALCULI.

BY CHARLES E. BARNETT, M. D.,

FORT WAYNE, IND.

Differential Diagnosis.—It is the aim of this paper to merely show the close relationship that exists between the pelvis of the kidney and upper portion of the ureter on the right side, with the gall bladder, cystic duct, hepatic duct and communicating duct of the liver and terminal ducts of the pancreas, with a sometimes similarity of symptoms from a pathologic invasion of any one of them, and more especially from stone formation.

Anatomy.—A needle passed through the right lumbar region, piercing the pelvis of the kidney, would pass directly through the descending duodenum, at which point the ductus communus choledichus and pancreatic ducts open (lower third of descending duodenum), then into the transverse colon. The distance passed through would be extra peritoneal. There is absolute apposition of the colon, duodenum and kidney at this point. The supra and infracolic portion being covered in front by peritoneum, derived from the kidney region. A stone after passing through the cystic duct would not be impeded in its movements until it had dropped into the ampulla of Vater, at which place the ostium duodenalis, the most strictured portion of the canal, would have to be dilated (unless collateral biliary circulation should take place through an accessory pancreatic duct), before it would pass into the duodenum. In total occlusion of either the cystic duct or the ureter, the muscular action in the gall bladder and pelvis of the kidney would be synonymous.

Some one has said that pain in the intra-scapular region is carried there by way of the phrenic, to the brachial and cervical plexuses, and from there thrown over into the intra-scapular region—the region possibly of least resistance in the whole body.

A more direct route and through a more likely kind of nerve tissue, it seems to me, would be by way of the splanchnics. The efferent circulation through the greater

splanchnic would reach the lower inter-scapular region (6 to 10 thoracic; scapula reaches seventh rib), and carried higher by way of connecting filaments (according to Dr. Beck), to the rest of the thoracic ganglia. The lesser and smallest communicate with each other, and also with the greater, so that they together would be able to drain the hepatic and renal region. According to Byron Robinson the nerves are enormous in number in the peritoneum covering the gall bladder. He also makes special mention of the profusion of Remaks nerve fibers in the kidney region. The intercommunication around the solar-plexus would account for the gastric and intestinal disturbances found. Pain in inguinal, scrotal, or inner crural regions, would come from the lumbar plexus, by way of the genito-crural and ilio-inguinal. The scrotal region also might get its pain from the spermatic (sympathetic).

Comparative Anatomy.—While it is slightly off the text yet interesting to note that the gall bladder is an organ that seems to have evolved, on account of the body's inability to consume the whole output of bile manufactured and thereby reserved a supply for a "rainy day" when the liver is not working. It is as logical to propose a reservoir for the salivary glands or pancreas, in fact, all the secretions that aid digestion, the same stimulation practically is given one as the other during the act of digestion. Then again the gall bladder might be given credit for filling during the stage of stimulation of the liver and pouring out its fluid during the interim. There can be no claim made for actual necessity, however, for one finds upon investigation, that according to Chauveau, some domesticated animals have no gall bladders, the horse for instance, and he rather leans toward the idea that the gall bladder originated from a dilatation of the cystic duct, on account of the flow from the hepatico-cystic ducts, to the ductus-communis. While it is hard to comprehend why an ox should have a gall bladder and a horse should have none, it is still harder to see how a deer can live without any *excretory duct* from the liver.

It was my pleasure, personally, to dissect a liver that I removed from a deer last January. There were no ducts to be found leading from the liver.

In the pigeon the arrangement of the excretory apparatus of the liver differs from that in the mammal, in that the cystic duct remains independent of the cholic duct by emptying below and behind the duodenal loop.

The kidneys and their excretory ducts are practically the same in the lower animal as in man.

Etiology of Stone Formation.—The proof seems positive that calculous formation in any of the mucous pouches is caused either by a stenosis, resulting in insufficient drainage, with a secondary invasion of pathogenic germ organisms, or from a primary bacterial infection. (Charcot, Gambault, Ochsner, Niles and others) and a secondary closure (partial), of the excretory ducts. The concentrated secretion, with a nucleus compound from bacteria and epithelium detritus, forming the stone.

Similarity of Symptoms.—Pain from either hepatic or renal calculi might go almost anywhere and would be merely a subjective sign of disturbance in that region. E. Owen, in speaking of the unreliability of pain says, "that the kidney draws its nerve supply blindfolded from the epigastric pool, and that it is small wonder if, in the absence of objective signs, that the patient and surgeon are sometimes lead by the subjective symptoms to make serious mistakes." Jacobson explains pain in renal colic as frequently due to the passage of flatus in the colon. In that case the pain producing area would be the thickness of the duodenum, nearer the liver than the kidney.

Hematuria, if present, is considered by some the sign most pathognomonic of renal calculi. Yet here one must differentiate from tubercular nephritis, passive and active congestion (which might be secondary to gall stone) from granular kidney and sometimes from syphilis.. Then, too, it would always be necessary to do cystoscopy, to exclude bladder and urethral bleeding.

Pyuria might result secondary to cholecystitis, cholangitis, duodenitis, colitis, pancreatitis, in fact from any inflammation within or around the kidney.

Nausea and vomiting are purely sympathetic symptoms and can occur in both renal and hepatic calculi, and can also be absent in both.

Appendicitis can simulate both renal and hepatic calculi. Icterus is a sign not to be depended upon, for it is

present frequently outside of stone formation. The most marked case of jaundice I have ever seen occurred in a soldier during the Spanish-American war, who had an entero-colitis complicated with nephritis; in fact the major portion of the

Northern soldiers were jaundiced on their return from the South.

Urine examinations throw but little light on the subject.

X-ray.—The X-ray, in differential diagnosis, is not so valuable in this region as elsewhere in the body and unless stereoscopic skiagraphy can be perfected sufficient to measure depth, there always will be a question in the mind of the operator. To illustrate this point, I have two radiographs, both taken from living subjects, one a renal stone, the other hepatic calculi. Both shadows are directly opposite the second lumbar vertebra and both shadows show in front of the right transverse process.

A day in Chicago, Mr. Fuchs, in regional work on the cadaver, gave us two skiagraphs, the one a female, in which I had passed malleable wire sounds into the ductus-communis, pancreatic duct and the ureter. The radiograph shows the ends of the sounds directly opposite the second lumbar vertebra, leaving a space about as large as a half dollar, which would correspond to the kidney pelvis.

Behind this body, in order to test the density of the shadow in the different kinds of renal-calculi, four artificial renal stones were placed. The first was composed of calcium oxalate, which shows the dimmest, the second uric acid, the third triple phosphates, (these two show about equal in density of shadow) the fourth was composed of all three combined, its shadow coming second in density.

The other cadaver, also a female, we injected mercury into the gall bladder, after ligating the terminal ducts, and passed the wire from the urinary bladder, up the ureter, into the upper quadrant of the kidney pelvis. The gall bladder, from the weight of the mercury, shows itself hanging down below and to the right of the second lumbar vertebra. The sound is above and internal, to the gall bladder shadow. This demonstrates two especial facts, a possible anomalous position of the gall bladder when weighed down with stone, and the near relation of the cystic duct, in this subject at least, with the upper portion of the pelvis of the kidney.

Notwithstanding the advancement that medical science has attained to-day, it is in my opinion impossible, in some cases, to make a differential diagnosis between hepatic and renal calculi. So in cases of doubt it seems logical to cut down

to the kidney first, and after that one can be governed by the findings he makes.

The following case is an illustration: Mrs. K., residence Fort Wayne, aged 49, no children, family history good, fath-

er lived 80 years, great grandfather 96, mother still living, one of twelve children, all healthy except oldest brother who has stomach trouble. Typhoid fever when 20 years of age. Never laced tightly; disliked milk; gives history of comparative

health from typhoid fever period to 12 years ago, at which time she had periodic attacks of colic, referred to the right lumbar region, which occurred about three times a year. Two years ago I was first called to see her during one of these attacks. The following symptoms describe her succeeding attacks, up to the time of operation: Intense pain in right lumbar region, inter-scapular region and in right labia. No jaundice, no tympanites until following day; no nausea except that caused from the use of chloroform which had to be used to control the pain. Examined fecal matter and urine repeatedly for stone without success. Operation advised, with a leaning toward renal rather than hepatic calculi, as cause of trouble. Operation April 9, 1902.

Nephrotomy.—Delivered kidney on back; needled some. During manipulation felt sack of stones inside peritoneal cavity. Replaced kidney, closed lumbar wound, opened abdomen in right rectus region, delivered gall bladder after breaking many adhesions, closed belly up to gall bladder; cholecystotomy eight days later. Many stones removed; seven stones found in stool after first operation. The inter-scapular pain was especially marked during the irrigations and dressings of the gall bladder.

(Illustrations loaned by the Annals of Surgery.)

DISCUSSION.

DR. F. D. SMYTHE, Memphis, Tenn.—I have recently been doing a good deal of work along this line and have made some observations that may be of interest to this Association, with special reference to the operation upon the gall bladder when the effect of the stones is an inflamation, either catarrhal, suppurative or gangrenous. The fact is well known to the surgeon that gall stone is very much more common than is usually supposed. This condition seems to prevail mainly for the reason that the general practitioner looks upon jaundice as being necessary before he will consent to make a diagnosis of gall stone. Gall stones are not associated with jaundice in more than 25 per cent. of cases. Jaundice, when persistently present, is due always to an inflammation of the common duct, or an obstruction. It is not infrequently seen in cancer of the pyloric extremity, and sometimes in cancer of the head of the pancreas or in syphilitic patients or hard drinkers. In cases where the jaundice persists for some time and fails to respond to ordinary methods of treatment we look for a malignant growth. Gall stones are secondary to an infection of the gall bladder, which may be from the intestine. Gall stones may or may not exist for quite a while without produc-

ing symptoms, but when infection sets up pain is produced.

The pathology of inflammation of the gall bladder and gall stone is varied and quite extensive, varying from a catarrhal inflammation to a gangrenous process, as was forcibly demonstrated by Dr. Eisenbach, of Chicago, where he assured a patient that he would die after an operation for cholecystotomy and found perhaps two-thirds of the liver destroyed and material which should have been converted into urea passed off as uric acid salts. It is far reaching clinically, this trouble, because of the tendency to involve the pancreas, whose function seems to be so imperfectly understood. Dr. Opey, by injecting aseptic bile into the pancreas produced pancreatitis and post-mortem revealed the presence of stone in the diverticulum and hemorrhagic pancreatitis due to a complete obstruction of the opening of the common duct.

The treatment of the condition is a question of the technic of the operation which is well understood and requires no special consideration, but the operation to be determined upon is of great moment to the patient.

Dr. Bransford Lewis, St. Louis.—I was unfortunate in being out when the paper was read and did not hear the report, but I want to add my voice to the caution made by some others with reference to skiagraphy in connection with a diagnosis of renal stones. I am personally acquainted with two cases in which the diagnosis was made of the presence of renal stones when an operation disproved the diagnosis. It is an important means of assistance and one that can be used to great advantage if certain precautions are taken. One of the cases, mentioned yesterday in my paper, in which a skiagraph was taken and three stones were apparently located in the left ureter of a male patient. I catheterized the ureter and found it clear. Another case I have had under observation for some time; and while it was very puzzling to me, I never believed there was a stone in the kidney, yet the patient met with a physician who took a picture of the kidney, which apparently disclosed two stones in the right kidney. After further investigation this was also disproved and the doctor who took the skiagraph himself admitted it was fallacious.

I don't disapprove of skiagraphy per se, but it should be used only as an assistance in making a diagnosis.

Dr. H. E. Pearse, Kansas City.—I want to add only a word. The remarks of the essayist in regard to the liver of the deer having been found without a common duct and his

remarks on animals in comparative anatomy calls my attention to another fact that I have noticed in post-operative work, that is, that the great excess of bile on dressings following operation does not occur immediately after the ingestion of food, as stated in the text books. The greatest saturation of bile, I have found is often away into the night, between two o'clock in the morning and breakfast, when digestion is entirely suspended. I have noticed this particularly in the last two cases I had.

I would like to second what Dr. Lewis has said in regard to the use of the X-ray in the diagnosis of gall stone as differentiated from kidney calculi. It seems to me this differentiation must be made entirely by the clinical picture presented, and that should be gathered at more than one attack. If gathered in repeated attacks of atypical cases we will soon find such symptoms as will lead us at least to a strong suspicion of the proper locality.

Dr. Emil Ries, Chicago.—As the X-ray has been mentioned in the diagnosis of gall stones I would like to say a word in favor of the use of the X-ray as assisting in the diagnosis. Certain cases are liable to mislead us, especially so, if we are satisfied with only one picture. If there is any question of stone, or of mistaking some other body for a stone, then the safe thing to do is to take pictures at different times. It is not likely that a cherry stone will remain in the same place, whereas it is very likely that a gall stone will. I recently had a case of a man where the presence of a renal calculus was apparent. The diagnosis could be made from the clinical symptoms, but I had an X-ray picture made and found five stones in the right kidney; four were of good size. When we operated we found the four stones without difficulty and I am quite positive that after finding those four stones I would have been very well pleased with the operation and stopped it there and considered myself lucky, but the fifth stone, which was no larger than a millet seed, would have continued to grow had I not had the X-ray picture.

The gall bladder is about as useful as the appendix—it is good for the surgeon to operate on. It does not do the patient any good. People have lived without gall bladders and today we take out gall bladders and the patients live as well. I have taken out six this year. There is no difference in the secretion, because the gall bladder is only a tank for storage, and it is a useless tank in which the bile stagnates and is liable to infection. Sometimes we operate on cases and don't find a gall bladder and we think the patient never had one. We should be careful about this, because cases are found where the

gall bladder is found in unexpected places. In one case I operated on I found no gall bladder and afterward at the post-mortem, in making cross sections through the liver I found the gall bladder completely surrounded by liver tissue. We know that people can live without a gall bladder, the digestion and functions of the liver going on beautifully.

DR. BARNETT, in closing.—The first speaker brought up the question of gall stone secondary to inflammtaion of the gall bladder. In many cases reported, typhoid fever is primary to gall stones. There are cases of gall stone secondary to typhoid fever, consequently we know that stones are produced in the gall bladder, or in any mucous sac, for that matter, by having an inflammatory action therein, according to Ochsner and others, from bacterial invasions, then closure of the channel to the outflow on account of the induration of the mucosa. The stone nucleus is then formed from the resulting inflammatory detritus, the stone proper being made from sedimentation from concentrated secretion. It seems to me that a pancreatic duct, with an accessory, might do a great deal colaterally, by carrying the secretion around through the accessory duct, but where we have the pancreatic duct closed we must necessarily have an inflammation and fat necrosis in that region.

In regard to radiographs, it is possible that we might be mistaken, yet in this cadaver experiment, of which I have a radiograph, all the stone shadows are seen very plainly, even with the fact considered that these stones were placed behind the body, the rays having to penetrate two walls rather than one. While it is possible that we might be mistaken, yet not probable, any way we want all the information we can get to assist in making a diagnosis in order to justify an operation.

Speaking of the fluctuation of the bile flow, it is my experience to see the fluctuation marked one day and not marked the next day; the dressings may be saturated to-day and but little flow tomorrow, or the flow might be heavy two days in succession. There is no general rule for that.

Certainly two sittings before the X-ray, with peristalsis of the bowels for twelve hours intervening between the sittings, would show a change of position of any foreign substance in the bowel. It seems to me that a skiagraph, if done as perfectly as demonstrations show, would locate a calculus and be a most marked assistance in the diagnosis of stone.

XV.—URETER-CATHETERISM—ITS PURPOSES AND PRACTICABILITY. WITH THE PRESENTATION OF A URETER-CYSTOSCOPE FOR MALE AND FEMALE.

BY BRANSFORD LEWIS, M. D.,
ST. LOUIS.

The purposes of ureter-catheterism, in connection with the cystoscope, are two-fold—for diagnosis and for treatment.

Diagnosis.—(*a*) To locate the origin of pus, blood tubercular products or bacilli, the various pyogenic infections, abnormally desquamated epithelium, etc., as to whether they come from (1) the bladder, (2) the right ureter, (3) the left ureter, (4) the right kidney, (5) the left kidney, (6) the right, or (7) the left peri-renal space and communicating with the corresponding kidney or ureter.

(*b*) To recognize and locate obstructive conditions in the right or left ureter from (1) stricture, (2) stone, (3) adjacent tumors, (4) bent or kink in the ureter from movable or dislocated kidney, (5) valvular junction of ureter and its pelvis.

(*c*) To determine (1) the presence of two kidneys, (2) if only one, which is absent.

(*d*) To determine the number of uterers present.

(e) To determine the functional activity of each kidney separately and relatively, with respect to its excretion or urea, albumen, quantity of urine, the specific gravity, etc.

(*f*) To determine the size and capacity of each kidney-pelvis, with respect to (1) hydronephrosis, (2) pyonephrosis, (3) total obliteration of kidney-secreting tissue.

(*g*) If there be kidney disease present to determine (1) if only one kidney is affected, or both; (2) if only one, which is the affected one; (3) if both, which is the one more affected; (4) if removal of the worse one be advisable, is the other one able to carry on kidney functionation sufficiently; (5) if removal of one is advisable, and the other is capable of supporting life, will the operation remove the infection from the body, removing the possibility of dissemination or re-contamination?

Treatment.—(*a*)—To enlarge narrowings or stricture at (1) the ureter openings, or (2) in the channel of the ureter. By facilitating drainage through the increased ureter-caliber, thus obtained, to assist in the improvement of pyelitis, or pyonephrosis, unilateral or bi-lateral.

(*b*) To irrigate and medicate (1) the ureters, (2) the kidney-pelves of one or both sides.

(c) To assist, by anesthetising and enlarging the ureter opening, the passage through it of a calculus or a plug of pus, blood, etc.

(*d*) To use the ureter, after it is catheterised, as a guide in certain abdominal and pelvic operations.

(*e*) By prolonged catheterization of a ureter, to assist in the cure of ureteral fistula.

To give some indication of the practicability of ureteral catheterism, as well as its clinical advantages, I wish to refer briefly to some of the cases in which I have used it.

SUPPOSED URETERAL CALCULI, ERRONEOUS X-RAY DIAGNOSIS.

CASE 1.—G. E. P., male, age 35, attorney, consulted me on the advice of his brother, a practitioner of Chicago, in May, 1902. He said that he had recently experienced some return of symptoms that had been with him some three years ago—frequency of urination, etc., that were finally diagnosed as indicative of stone in the bladder, for which he was operated by the crushing method. This removed the stone but not the inflammation, and during the past three years he has had more or less of the irritative symptoms. I found no organic lesion present, and was giving mild, antiseptic treatment which was doing good, but on a trip to Chicago he was induced to have an X-ray photograph taken of his abdomen, on the suspicion that it might be a return of the calculous deposit. What was his surprise and horror to be shown the shadows of three stones, evidently lodged in his left ureter, as the photographer explained to him. This was somewhat of a poser to me, when he recounted it to me on his return; nevertheless, as I had failed to notice any indications of the presence of urinary calculus at any point, I refused to be convinced without further evidence. While he thought it useless to make the test since the stones could be plainly seen in the negative, he acceded to my suggestion of ureteral catheterism. Under cocaine anesthesia,

with my instrument, in about five seconds after entering the bladder I passed a flexible catheter into the left ureter (the one supposed to contain the stones) on up as far as the renal pelvis; not a particle of obstruction nor of scratchy feeling was perceptible, and the urine drained from that side during the next ten minutes was as clear as crystal. There was an immediate and complete disproof of the accuracy of the X-ray finding, and a large degree of relief to the troubled mind of the patient. I later had the satisfaction of an acknowledgement of similar import from the photographer, who thought it must have been "cherry stones," possibly lodged in the colon over the ureter.

CHRONIC UNILATERAL PYELITIS AND CYSTITIS PELVIC IRRIGATION.

Case 2.—A. J. M., male, age 28, street car conductor, referred by Dr. Y. H. Bond in November, 1901. Following on an incompletely cured attack of gonorrhea of two years previously, the patient had noted certain pains and dull aches in the bladder and perineal region that were growing and becoming a serious interference with the carrying on of his employment. I gave tonic treatment to his prostate, vesicles and bladder, the organs which seemed to me to be at fault, attempting to eliminate a bacterial infection of colon bacilli with internal and local antiseptics, and giving periodic massages and hot rectal siphons. This was continued during November, December and the following January with unsatisfactory results—only moderate improvement at best. In February, 1901, more because of the rebelliousness of the condition than anything else, I suggested ureteral catheterism, in order to learn if the infection reached higher than the bladder. On February 25th, at my office, under cocaine anesthesia, I catheterised the right ureter and drained good, clear urine therefrom. On March 26th I again catheterised the same (right) ureter, with the same result—clear, healthy urine. On April 14th I catheterised the left ureter, and obtained definitely cloudy urine, containing pus and actively motile colon bacilli. Before withdrawing the ureter catheter, but after removal of the cystoscope, I washed out the kidney pelvis with hot 2 per cent. boric acid solution, repeatedly running it in and out by means of funnel and rubber tubing. On May 7th I again catheterised the left ureter, finding the urine much clearer than on the previous occasion, and the boric irrigation was repeated. The same measures were carried out again on May, 14th, June 2d and 19th, each time showing marked im-

provement in the urine in its clearness and freedom from infection, and the various symptoms for the first time had been ameliorated to a satisfactory extent. Each time after catheterism the patient went from my office to his work, which he was enabled to resume with energy and ability. He was discharged from further treatment and has needed nothing of the kind for a number of months.

This was a case of bacterial infection and irritation, not only of the bladder and urethra, but also of the left ureter and pelvis, and as rapidly as the infection of the uretra and bladder was removed, it was just as quickly renewed from the infecting focus above. With this removed by the ureter washings, the whole case was cleared up and relieved. I have noticed, in such cases of bacterial infection, that one must be vigilant and persistent for some time after the disappearance of the bacteria, as they are prone to recur even after having been cleared up a number of times.

I have had two other cases, one male, the other female, that were the subject of unilateral pyelitis chronica, that were markedly improved by similar pelvic washings, the frequent repetition of the measure showing you the ease and reliability with which the measure was carried out (at my office, and with local anesthesia), and also showing its relative freedom from danger with reference to carrying in infections of any sort. I have not yet seen any serious consequences ensue from ureteral catheterism; and I am the more convinced and gratified at this fact since I have had some experience with tuberculous infections of the urinary organs—that *nole me tangere* of this field. If there is anything that may be counted on to do harm to tuberculously inflamed urinary organs it is local instrumentation. And yet the records of the following two cases fail to indicate any harm done and, on the contrary, recite extremely gratifying results for tuberculous processes:

CASE 5.—Mrs. H. S., referred by my friend, Dr. Goodner, of Nashville, Ill., came in January, 1902, age 25 years. To rehearse the endless symptoms and agonies suffered by the patient afflicted with active tuberculous inflammation of the bladder and other urinary organs, is scarcely necessary here; but this poor woman had her share of them. The symptoms began two months after marriage, in 1893. Without any vaginal discharge, she noticed rather rapidly increasing fre-

quency in urination, and, as she expressed it, she could not hold the urine at all, in a short time thereafter; there was much sediment in the urine, and often it was quite bloody, or the dripping of pure blood at the end of urination. There was some pain in the back on the left side, passing thence down into the left hip. She lost in weight, and at the time of her arrival in the city she looked almost cadaverous. The mixed urine taken from the bladder contained both blood and pus, as well as many tubercle bacilli. Cystoscopy with my Nitze instrument proved a failure because of the rapid clouding of the fluid medium; but with my own female cystoscope, I not only discerned tuberculous ulcerations in the bladder mucous membrane, but succeeded in catheterizing both ureters successively. The urine from the right side gave pus, blood and tubercle bacilli in abundance, whereas that from the left side showed only moderate involvement in the inflammatory process, and we could not find any tubercle bacilli in it. Iodoform-oil injections into the bladder were used regularly for a time. There was such decided amelioration in the symptoms and improvement in the general condition, clearing of the urine, etc., that the patient would not listen to any operative procedure, even if I had urged it on her, which I did not, in view of the improvement. If we could have eliminated tuberculous infection of the bladder and the other kidney, the removal of the tuberculous right kidney would have been the procedure of election. But since the bladder was proved to be involved, I deemed it best to try general tonic treatment, combined with the iodoform injections mentioned. My last report from the patient is that she has improved much, both locally and generally. Her weight has increased considerably.

HEMORRHAGE CYSTITIS AND PYELONEPHRITIS BI-LATERALIS.

CASE 6. This case shows the difficulty and uncertainty of diagnosing the source of hemorrhage from the urinary tract in some cases. I have on a former occasion reported a case of renal hemorrhage that gave symptoms and indications that led to the positive but erroneous diagnosis of the vesical neck as the source of origin. F. L. I., age 28, a storekeeper, male, was referred to me by Dr. W. H. Stauffer, of this city, on March 31, 1902. Following after a prolonged attack of acute primary urethral gonorrhea, there were various heroic measures adopted by the patient's first physician, the final one being a strong irrigation of permanganate of potassium. This set up a severe stranguary, excruciating pain, both between and during urinations, and

the passage of large quantities of blood in the urine; besides fever, chills, etc. On reeciving the patient, Dr. Stauffer adopted various soothing treatments, but with only a moderate degree of success, and then referred him to me. Because of the depleting agencies present, the patient was extremely weak and anemic. With each act of urination there was spasmodic straining, severe pain, followed by the squeezing out of blood or clots. Strong sedative measures were instituted, absolute rest, hot applications, but no injections or irrigations into urethra or bladder. While moderate improvement resulted, there was persistence of the bleeding and of certain of the symptoms (stranguary, etc.) and occasional relapses, so that by the middle of April not enough benefit had been attained to justify the continuance of the measures directed on that line—which had included the injection of adrenalin and of gelatin solution, and the internal administration of ergot. Besides, his anemia was becoming alarming.

Because of the persistence of the bleeding, notwithstanding the freshness and brightness of the blood (which would naturally incline one to think it coming from the bladder only), I began to think that it was coming from a point higher up in the urinary tract. Therefore, under cocaine anesthesia, I introduced my cystoscope, on April 20th. Free bleeding from the bladder membrane was clearly evident, in the neighborhood of both ureter openings. It was so free that no view could have been obtained by one using a lens-cystoscope with fluid medium for bladder distension. The fluid would have clouded almost before the instrument could be introduced, putting an end to the endeavor. With mine, however, and air-distension, this made practically no interference, so far as the observation of the bladder was concerned; and when it came to inserting the catheter into the ureter opening, I adopted a maneuver that was quite successful in keeping the field clear of blood while I searched for the opening. That is, I ran the ureter-catheter beyond the end of the cystoscope, down into the base of the bladder, where the blood was collecting in a little pool; an assistant kept up continuous aspiration from this pool by pumping on the outer end of the catheter while I was searching for the opening. It was easily found, the catheter was withdrawn sufficiently to bring it in range and run it into the ureter. A small quantity of very bloody fluid was the result, showing that although bleeding from the bladder membrane had been demonstrated, that was not the only source;

it was coming also from the left kidney. And, in order to complete the investigation, I catheterized the right ureter two days later, and drained bloody urine from it, too. Hemorrhagic cystitis and pyelitis bi-lateralis was the more complete diagnosis, then; and the numerous rod-shaped bacilli (colon) appearing in the two ureter urines, gave a clew as to the cause of the condition. Extension of a mixed infection upwards, following a gonorrheal urethritis, possibly superinduced by injudicious medication.

A surprising sequence of this instrumentation was that, instead of its making the patient worse, causing renewed chills, etc., marked improvement began from that day; and he gradually recovered from the severe symptoms, while the bleeding, frequency and other harassing effects disappeared to a large degree. Now there is occasional tinging of the urine with blood when he has been too active physically, and he is not yet entirely well, but pelvic inflammations of the kind are not prone to get well in a hurry. I shortly ago began the use of boric acid irrigations into the renal pelves, and hope to do further good in this way.

TUBERCULOSIS OF THE BLADDER AND BOTH KIDNEYS.

CASE 7.—Male patient, age. 36, referred by Dr. Vernon, Charleston, Mo., consulted me first in December, 1901. He had had an attack of gonorrhœa sixteen years before, but the present affection was first felt nine years ago. There had been, in addition to the usual irritative symptoms, large collection of pus in the urine, urinary frequency, and also occasional attacks of pain in the left renal region, simulating renal colic. I catheterized each ureter successively with local anesthesia and without much inconvenience, notwithstanding the excessive tenderness always present in urinary tuberculosis cases; purulent urine was drawn from each side, and guinea pig inoculation with each gave positive results, so that tuberculosis of both kidneys was proved; and through the cystoscope tuberculous ulceration of the vesical membrane was apparent. Iodoform emulsion injections, together with guaiacol and cod-liver oil internally, were used in this case also, and have given considerable improvement, both locally and generally. Operative interference in this case is out of the question, of course. That was made evident by the ureteral catheterism. If this procedure were always followed out in such cases, we would not hear of one tuberculous kidney being removed while the other one, even worse affected, is left to do the work of two, fails in the undertaking, and the patient dies long before he otherwise would.

MOVABLE KIDNEYS, UNILATERAL PYONEPHROSIS, OPERATIVE FISTULA.

CASE 8.—Mrs. I. S., housewife, age 27. This case illustrates the necessity of making a complete, rather than a partial, diagnosis of urinary affections, and the difficulties that may follow neglect in this particular. Married in 1894, the trouble began in 1898, with frequency and pain in urination, and the occasional passage of blood in the urine. A surgeon diagnosed cystitis, and for its relief made an opening through the vesico-vaginal septum; that opening has been draining ever since—even to the present day. It did not relieve the distress in frequency, nor the pain in the bladder and both lumbar regions; and when she consulted me in March 1902, she had practically given up her care of her household. On looking into the bladder I could see the fistulous opening, from which the air of my inflation quickly escaped into the vagina. The bladder wall elsewhere was relatively unaffected. Catheterism of the ureters gave, for the right, clear, healthy urine; for the left, cloudy, purulent urine; and tests of the renal pelvis showed that it possessed considerable capacity—was able to hold about a half ounce of boric solution, the explanation of which was learned when I palpated the lumbar regions. While both kidneys were found to be movable (the right one moderately so), the left one hung far down into the abdomen while the patient assumed the erect posture, and easily slipped back into its proper place on her reclining. In falling downward and forward, it had been in the habit of making a kink in the ureter, obstructing the outlet through the ureter, distending the pelvis and furnishing the "receptive state" for bacterial invasion that resulted in the pyelitis and incited the various symptoms of which she had complained. The indication in this case was, not in the making of a urinary fistula, but the anchoring of the two kidneys in their proper place, followed, if it proved to be neecssary, by the regular washing of the left renal pelvis. As she had suffered much both from the affection and from previous surgical manipulations—she had been operated on three times for the closure of the fistula, and without success—she could not be prevailed upon to undergo another surgical procedure of any kind, and so carries her condition to the present.

PYONEPHROSIS AND PERI-RENAL ABSCESS; FAILURE OF THE HARRIS SEGREGATOR TO INDICATE THE CONDITION; CORRECT DEDUCTION MADE FROM URETER-CATHETERISM.

CASE 9.—Male, age 39, had suffered many years from pain in the back and other symptoms of chronic urinary affection. Because of this and of the purulent urine present, the Harris segregator was used, giving comparatively clear urine from the right side, but cloudy urine from the left. It was considered from this, by the surgeons who made the test, that there was a pyelitis present. Later I was asked to make a ureter-catheterism. I inserted the catheter into the left ureter, but it would only go in a part of the way; it was withdrawn and re-inserted several times before it finally was pushed up about two inches into the ureter. Even then it did not drain immediately; so after waiting ten minutes or so, I applied aspiration to the outer end of the catheter, and by strong pumping, got out *one drachm of pure pus*. Instead, then, of there being simply a pyelitis, there was a renal abscess with an imperative demand for operative interference. On operating through the left lumbar region, I found the kidney dilated with over a pint of pus, and a stone in the renal pelvis. The segregator could not possibly have attained the results given thus by catheterism and the strong aspiration. The thick pus was not draining from the ureter, and hence could not have gotten into the segregator tube.

These cases present some of the clinical phases of ureteral catheterism. They do not rehearse anything so very remarkable in the way of results in treatment, etc., but they serve to show that ureter-catheterism, in both male and female, has been reduced to a practical procedure that should rapidly become of great service to the profession. It is no longer an idealistic maneuver, that we hear about but never see, but is one that is accomplished every day by those versed in it, and with the highest degree of satisfaction.

While the complicated and costly European instruments have not done much to popularize the procedure, I believe the simpler ones of American make will soon do the missionary work that will enlist the attention of the profession in the practical nature and value of this field.

While most of the ureteral catheterism that I have done

has been accomplished with my model containing only one channel for ureter-catheter, my latest model is double-barreled, so that with two catheters in place, after inserting the lighter colored one into the left ureter and pushing it far enough into the ureter to keep it from pulling out during the further manipulations, the inner end of the cystoscope is turned towards the other ureter, the remaining catheter (a dark one) is inserted into it in a similar manner; the cystoscope is then withdrawn, leaving two catheters draining synchronously from the two kidneys. This (synchronous ureter drainage) is of great value, not only in the way of affording immediate re-

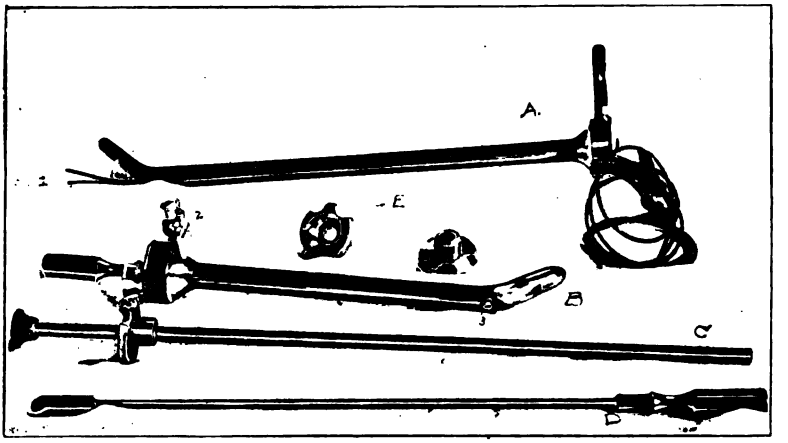

Fig. 1. A—Male Ureter-Cystoscope. B—Female Ureter-Cystoscope. C—Telescope for both. D—Obturator for Male. E—Windows for both. 1—Ureter Catheters protruding from Ureter Tubes. 2—Air Tube and Cock. 3—Opening of Ureter Tubes.

sults and avoiding repetition of the procedure, but also for comparing the secretions of the two kidneys *at the same time* and under the same general influences. This feature has been elaborately studied by Casper. By it is determined the relative functionating capacity of the two kidneys, etc.

Technique for the Bransford Lewis Ureter-Cystoscope.—Extended descriptions of the previous forms of this instrument having already been given (first presentation before the American Association of Genito-Urinary Surgeons, May 1, 1900, Jour. of Cutan. and Genito-Urinary Diseases, 1900, page 420), the present form is easily understood. Its main points

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for the purpose of bringing the hypertrophied prostate or outgrowths from it into view. With this assistance I expect the definite diagnosis of the form of prostatic enlargement to be much simplified.

For the satisfactory use of this instrument it is necessary to have an operating table that is capable of giving high pelvic elevation, with the legs in flexion, for instance, in stirrups. With the patient placed in this position (excepting the pelvic elevation, which is made after the anesthetic is applied), the bladder is washed and emptied with a soft rubber catheter. This washing is merely for antiseptic purposes, not for facilitating the work of the cystoscope. One or two cocaine tablets (one and one-eighth grain) are then deposited in the posterior urethra and bladder neck by means of my urethral tablet depositor. The foot of the table is now elevated to an angle of about forty-five degrees; the cystoscope is introduced, the obturator withdrawn, the small quantity of urine that has been collecting since the washing is sucked out through the aspirator, the window applied to the ocular end, the light turned on. While the operator is looking through the main tube, he gently pumps in some warmed air by means of the inflating pump, and watches the walls of the bladder unfold and expand. A view of the whole interior of the bladder is obtained in panoramic sequence by moving the beak around; and when the ureter openings are looked for they are sought at the upper angles of the trigone. When the little ridge or dimple indication of one is found, the catheter is easily shoved into it, and on up into the ureter. If it is desired to catheterize the other ureter also, the first catheter should be inserted rather far up, to insure against pulling it out in the further manipulations. Then the beak is directed toward the other ureter opening; when it is found the remaining catheter is pushed into it in the same manner as previously described. The electric cord and the air pump are disconnected, the air-cock opened, allowing of the escape of air from the bladder, and the cystoscope is removed. Care must be taken, in doing this, to feed the two catheters into the tubes as the cystoscope is being drawn out, so that when it is re-

moved the catheters are still contained in the ureters, where they may remain and drain the ureters for from ten minutes to a half hour, according to the amount of urine desired for testing. During this time the patient may lie comfortably on the same table, which has been replaced in a more normal position. If either catheter does not begin draining in a reasonable length of time, gentle aspirations may be made on it by means of the small syringe shown in Fig. 2.

If it is desired to wash out the kidney pelves, that is done after finishing the drainage. A glass funnel with four or five feet of soft rubber tubing attached is filled with hot, saturated boric acid solution, and connected with the ureter catheter by a small piece of tubing, a piece of glass tubing helping in the transition between sizes, if necessary.

After these several manipulations irrigations of the bladder should be carried out with some mild, soothing antiseptic, such as warm boric solution.

In the female, examination of the bladder and ureteral catheterism are more easily carried out, both because of the shorter distance to the bladder, and because of the lessened resistance offered the in-flow of air. If the clothing of the female is well loosened about the abdomen, on elevating the pelvis and inserting the cystoscope and removing the obturator, the bladder usually balloons out without the necessity of inflating with air. In the male, on the contrary, this is not usually the case, although it does sometimes happen where good anesthesia is secured.

One of the most troublesome impediments to easy cystoscopy and ureter-catheterism by this method is that offered by the persistently contracting bladder—a spasmodic condition that is beyond the influence of the patient's will, that holds the bladder walls in a rigid state, resistant to the required movements. This is best overcome by adding to the anesthesia. Withdraw the cystoscope, drain the bladder of accumulated urine, and deposit one or two more cocaine tablets in the posterior urethra and vesical neck, then re-insert and continue the investigation. While no harm comes from the moderate inflation of the

bladder with air, it is a fact that air is slightly more irritating to the membrane than water; but this is especially true of cold air. To obviate this, I am now using warm air, secured by an assistant holding the in-take bulb over an alcohol flame during the process of inflation. When the telescope is in use, it is well to pump in the air through one of the ureter tubes, since the telescope itself occupies the main tube. If at the same time it is desired to remove the balance of the in-flowing urine, it may be aspirated through a ureter catheter passed into the bladder through the other ureter tube. In several of the cases that I have catheterized I feel positive that, because of the rapidity of accumulating blood, catheterism could not have been accomplished by means of the lens instruments and fluid medium.

I would not advise anyone to attempt ureter catheterism without sufficient equipment to secure, at least, the necessities of the work; and chief among them is a table that will furnish pelvic elevation. This allows the in-flowing fluids or blood to gravitate away from the field of search. The Willbrandt Surgical Instrument Manufacturing Company, of St. Louis, is now making for me a table which I expect to be extremely satisfactory in this and several other respects, adapted to all genito-urinary work done in an office, but especially serviceable and comfortable for ureter catheterism.

I have been much interested in studying the limits to which one may go in putting cocaine into the bladder without causing a toxic effect. While I have on several occasions noted systemic effect from the use of cocaine in the urethra, I do not remember of ever having observed it as a result of absorption from the bladder, although I have often used five or six grains in tablets. In doing litholopaxy in the aged, Dr. Chismore, of San Francisco, habitually injects two or three ounces of 3 per cent cocaine solution into the bladder; and Dr. Swinburne has mentioned equally satisfactory results from a similar use of cocaine in litholopaxy. I use tablets made in two sizes, $\frac{1}{2}$-grain and $1\frac{1}{8}$-grain, by the Searle & Hereth Company. The Rochester Surgical Appliance Company, of Rochester, New York, are the makers of the cystoscope, and I take pleas-

ure in thanking them for the able assistance they have given me in its development, as well as for their accurate workmanship.

DISCUSSION.

DR. JOS. RILUS EASTMAN, Indianapolis.—Dr. Lewis's paper is very timely and he deserves the thanks of the profession for his valuable contributions. The doctor has gotten away from the idea of prisms. The older cystoscope of Casper, with its attachment for ureteral catheterization, contained three light refracting prisms. Every one consumed 20 per cent. of the light, and by the time the light reached the eye, 60 per cent. of it was gone and the illumination was poor. When the bladder is filled with air, we get rid of disturbing reflexes incident to filling the bladder with water. We know what imperfect images we get of objects when we look at them through a tumbler of water. In the new Casper cystoscope there is only one prism, still an odd number, so that the picture is inverted. It requires a high degree of skill to introduce the catheter through the Casper instrument. It has never become very useful or generally accepted in practice.

Dr. Lewis, with his skill and experience, may be able to withdraw his cystoscope with two ureteral catheters in the ureters without displacing the catheters, but I don't believe that I could do it, or that many others could do it. The same objection applies here as applies to Kelly's catheterization of the ureter—it requires a wizard to do it; therefore, I think Dr. Lewis ought to use here one of the principles of Casper's instrument, that is, the principle of the sliding, removable roof, so that when the ureteral catheter lies in the ureter, by withdrawing the roof through which the catheter is passed, the catheter becomes entirely free in the bladder and the cystoscope is readily withdrawn. I have found it difficult sometimes to withdraw the instrument when the ureteral catheter was entirely free, and with two ureteral catheters passed through non-detachable tubes, it would certainly be very hard.

The paper is an extremely valuable one, and the doctor deserves great credit for his work, but I think it would represent a decided improvement if the instrument had a removable roof on the tube for the introduction of the ureteral catheter. It is a brilliant thing to catheterize both ureters at one sitting, but it is entirely unnecessary. We can introduce one at one time and the other subsequently. If Dr. Lewis

would do away with the double-barreled idea, he could use the removable roof. With the air inflation of the bladder, which is of inestimable value, and the Rochester cold lamp, which has almost revolutionized cystoscopy, and the removable roof of the Casper instrument upon the catheter tube, I believe we would have an almost ideal cystoscope for ureteral catheterization.

Dr. E. G. Mark, Kansas City.—Up to about a year I made use of the Casper and Nitze instruments for the purposes of intravesical examination and ureteral catheterization, but found both extremely unsatisfactory. I was never able to catheterize the male ureter with either instrument, and consoled myself with the thought that the procedure was next to impossible. My attention being called to the Rochester instrument, bearing the firm's name, I procured one and found that so far as intravesical examination went, it possessed many advantages over the continental instruments on account of the direct view as opposed to the lens system, and the use of air as a dilating medium in place of water. With it I managed to catheterize the ureter, but with great difficulty. In fact, the instrument was made for the use of a person possessing four hands and two proved inadequate.

With Dr. Lewis's instrument I have found ureteral catheterization practically an easy matter, making out of what was an ideal to be attained a practical procedure. I recall one case in which, after introducing the instrument into the male bladder, I was able to catheterize the ureter in less than a minute, a thing I believe to be impossible with the Casper, Nitze or any other instrument.

As to the great difficulty of withdrawing the instrument while the catheters are draining, I will say that I have only used the cystoscope with the single ureter tube, but I have never had any trouble in withdrawing the cystoscope and leaving the catheter in the ureter.

The previous speaker also mentioned the needlessness of a double ureter tube, but I can understand that in a number of cases it would prove of benefit in making a quick diagnosis. Dr. Lewis's instrument is both ideal and practical, if I may be allowed the bull, and I think he is to be complimented.

Dr. Lewis, in closing.—I had not overlooked the matter of a removable roof for the cystoscope, but my own preference is for the present form of instrument. I have been using the single catheterizing tube and that is still at the service of Dr. Eastman, or anyone who prefers it. For myself, I have

a great leaning to the double tube. It enables me to catheterize and drain both ureters at the same sitting, a tremendous advantage. The removal of the cystoscope, leaving the catheters in place after having been introduced into the ureters, is not anything like as hard as it would seem. It is much easier than Dr. Eastman anticipates. I can assure him on that point. The greatest difficulty is to find the ureteral openings. After finding them and inserting the catheter, you will have no trouble about withdrawing the cystoscope.

There seems to be an impression that the Rochester Company anticipated me in the use of air in connection with the cystoscope. I showed this instrument at the meeting of the Genito-Urinary Surgeons' Association some months before the Rochester Company put their instrument on the market, so that I can claim, not only priority, but originality of the idea.

I want to thank you for the generous reception given this instrument.

XVI.—LAMINECTOMY FOR FRACTURE-DISLOCATION OF THE FOURTH AND FIFTH CERVICAL VERTEBRAE.

BY JOSEPH RILUS EASTMAN, M. D.,

INDIANAPOLIS, IND.

The following report concerns a Mr. B., aged 52 years, or Arcadia, Indiana. At the time of the receipt of the injury described he was at work in a saw mill. While attempting to slip a heavy belt over a fly wheel, a set bolt, which held the wheel to the revolving line shaft, caught his jumper and undershirt at the back of his neck, producing a sudden and very violent flexion of the cervical spine. The writer first saw the case six hours after the accident.

The man was entirely conscious and cheerful. He complained of sharp pains in the hands and arms and of soreness over the area at the back of the neck to which the violence was applied. There were no muscular contractions nor twitchings and there was no priapism. The voice was strong. There was a slight dysphagia.

Respiration seemed to be altogether diaphragmatic, but dyspnea was not marked. The rate of respiration was twenty-four.

The temperature was subnormal (97 degrees), but reached 104 during the first day.

The pulse registered fifty beats to the minute and was rythmical and full.

The head was not rotated to either side upon its vertical axis, nor was the horizontal axis changed. Passive antero-posterior and lateral movements were accomplished with but slight pain. Motion, sensation, and the special senses of the head were normal. There was no disturbance of speech. The face was somewhat reddened.

The pupils reacted to light and accommodation, and were slightly dilated. The interpalpebral spaces were normal in shape. Sensation (tactile heat and cold) was suspended over the whole surface of the body, excepting the head, neck, shoulders and the outer side of the arms and forearms to the wrists.

Motion was restricted to the muscles of the neck, shoulders and arms, the supinators of the forearms and the diaphragm.

The result of attempts to elicit the arm, abdominal cremasteric, and patellar reflexes was negative. The plantar reflex was present. The so-called meningeal streaks did not appear upon pressure.

Examination with the finger disclosed no marked relaxation of the anal sphincter.

There was retention of urine, but no dribbling.

The pharynx was examined with the finger, but no information of any value was secured in this way.

It was not possible to discover any of the ordinary cardinal signs of fracture. There was neither crepitus nor abnormal mobility. Whatever deformity was present was completely masked by the swelling and edema of the soft parts overlying the injured spine.

It was evident from the consideration of the symptoms enumerated that the man had sustained a severe injury to the cord in the mid-cervical region, but no more exact diagnosis could be made. It must be admitted that fracture of one or more bodies or laminæ, dislocation or severe simple trauma with hemorrhage and consequent pressure upon the cord, each alone or combined, might have produced all of these phenomena.

The patient's great depression, the unfavorable site of the injury, the absence of reflexes, the inaccurate diagnosis and the inauspicious surroundings were deemed to be sufficient

reasons for deferring operations. Therefore, after an unsuccessful attempt under ether anesthesia to reduce the pressure upon the cord by extension, counter-extension and manipulation, according to Hueter's suggestions, the man was placed upon a rather hard, slightly inclined bed, elevating his head, which was loosely held in a Sayre's suspension collar and supported posteriorily and at either side by pillows. The suspension collar greatly annoyed the man and was removed after a few hours.

During the first twenty-four hours the pulse rate increased from 50 to 110. The temperature occasionally ran up to 104, but was reduced by general and continual alcohol sponging. A bed sore about seven inches in diameter and extending deeply into the muscles, developed over the sacrum during the first twenty-four hours, in consequence of the paralysis of sensation and the trophic disturbance, notwithstanding the skin of the back was regularly rubbed with alcohol and care was taken to avoid folding or wrinkling the sheets. Catheterization was performed regularly. Sugar appeared in the urine upon the second day.

Under a symptomatic and stimulating treatment the patient gradually lost ground, the pulse lost in volume, the voice became weaker and the dyspnea more marked. Paralysis became complete in the arms, forearms and shoulders. On the twelfth day a laminectomy was made.

Keen advises against operating in fractures of the cervical vertebrae if the patella-reflex be abolished. Other respectable authorities contend that it is not only justifiable, but incumbent upon the surgeon to interfere in these cases.

The writer's patient requested that the operation be executed, stating that he preferred death to a life of probable helpless and hopeless paralysis. The operation was made in a small farm house, Doctors Hicks and Ray assisting. Being rather a rotund individual, placing him upon his abdomen caused pressure of the abdominal viscera against the diaphragm, and consequently great embarassment of respiration. The respiration seemed to depend entirely upon the phrenic nerve. He was therefore placed in the left latero-prone posi-

tion. The laminæ were exposed by the customary median incision and retraction of the muscles. The great depth of the vertebrae in the neck increased the difficulty of exposing the laminæ. The spinous processes of the fourth and fifth cervical were found to be abnormally mobile. The laminæ of the fifth were fractured at either side of the base of the spinous process. The arch of the fourth was fractured upon the right side only. The laminæ and the spinous processes of these two vertebræ were removed with the bone-cutting forceps. Chisels were not used upon the broken laminæ for the obvious reason that they offered no resistance. The dura was exposed one and one-half inches, but not opened. Drawing the membranes and the cord to one side, it was found that the body of the fifth vertebrae was dislocated forward upon the body of the sixth. The displacement, however, was slight, producing no compression of the cord.

The operation thus far had consumed twenty-five minutes. The pulse had become almost imperceptible and the respirations were thirty-five to the minute and shallow. The wound was hurriedly closed, and the patient returned to bed. Artificial respiration was practiced for an hour. Normal saline solution was copiously injected into the tissues of the right breast. Hot water bottles were placed in the bed, and strychnia was given hypodermetically. The man recovered rapidly from the shock of the operation.

Upon the second day after the operation the patellar tendon reflex reappeared in a slight degree. Foot clonus was also present upon both sides. Upon the third and fourth days the patient flexed both legs. Tactile sensation was also improved in the legs, as was also the sensation of heat and cold. The respirations became less frequent and less labored. Upon the fifth day after the operation a low murmuring delirium began to develop and upon the nineteenth day after the injury the man died, apparently from exhaustion. The bed sore upon his back had assumed frightful proportions and had kept up a sapremic fever. We were not permitted to make an autopsy.

The diagnosis of fracture dislocation in the cervical region

unless an X-ray machine be at hand is not easy. Knowledge of the nature and severity of the traumatism furnishes little aid. The writer noted the case of a man who fell from a great height upon the back of his neck. There developed almost immediately total motor and sensory paralysis below the shoulder. This case proved to be one of simple severe trauma with hemorrhage, and recovery was complete and prompt. Upon the other hand a stalwart factory hand was playfully pushed backward by a comrade. He fell, striking the back of his head lightly against the floor. Death was almost instantaneous and at the autopsy the writer found dislocation and extensive fracture of several cervical vertebrae. In the majority of cases of severe injury to the cervical spine, with paralysis, it will not be possible to make a diagnosis without operation. The operation *per se* is not dangerous and the patient is not subject to very grave additional conditions. As Mears has said, by repeated operations our knowledge will be increased both as regards diagnosis and the results of treatment.

Keen, by studying the localization of the functions of the segments of the spinal cord, has produced a table showing the extent of the motor and sensory paralysis after injury in each segment. Such a table will undoubtedly furnish help in locating lesions, yet as Sonnenburg has shown, paralysis after fracture of the cervical vertebrae are extremely irregular in the way they appear and in their course. Even in cases in which death occurs in a short time after the accident the paralysis does not always come on immediately. On the other hand, paralysis may come on promptly and the case go on to a complete recovery. Sonnenburg says that the recorded cases of late and gradual paralysis are due to the formation of a gradual dislocation or by the increase of a blood extravasation. It is to be remembered that the cervical canal is relatively large and in the beginning a slight dislocation or extravasation may not cause any symptoms of compression.

From these facts it appears that operation is the only means of securing an accurate diagnosis. Therefore a doubt as to the nature of a lesion should weigh in favor of rather than against the operation.

Riggs of Birmingham, Alabama, observed that to sit quietly by in the soft shadows of Providence with these cases and allow them to run their course before relief by operation is attempted, is not in conformity with the teachings of modern and progressive surgery. Most surgeons will subscribe to the opinion of Riggs rather than to the rule of Lauenstein, which is to the effect that several weeks should elapse after the injury to allow nature unaided to attempt repair. As a general rule the persistent absence of the reflexes, especially of the knee jerks, is an evidence that there has been severe cross injury of the cord, but the absence of the knee jerk cannot be taken as proof that the cord has been completely destroyed.

Schede, Hammond, Phelps, Keen and Forbes, and others, report cases which show that the suspension of the knee jerk does not always mean complete destruction of the cord in any segment.

If laminectomy is justifiable in the treatment of fractures elsewhere in the spine, it is justifiable in the neck. If the danger attending laminectomy is increased as we ascend the spine, the danger of leaving cases of fracture to the unaided efforts of nature is likewise increased as we ascend the spine, in the same or greater proportion. Replacement of the body of a dislocated vertebra by extension, counter-extension and manipulation is in the very nature of things very difficult to perform and it is doubtful whether this method has any value whatever. There are several authentic reports of spontaneous reduction, but none of successful reduction by extension and external manipulation. It is certain that very few cases have been benefited in this way. By operative means it is possible to reduce dislocation, as was shown in the case reported by Church and Eisendrath. In this case there was a fracture dislocation of the tenth and eleventh dorsal vertebrae and the paralysis which existed disappeared at once. There is no reason why the same result might not be secured under similar conditions in the neck. There is little doubt but that cases of fracture of the spine, even in the neck, will be operated upon more frequently in the future than in the past, in view of the utter hopelessness of so-called conservative treatment. It is

little better than culpable neglect to omit operation in cases of fracture involving the spinous processes and laminae only. The procedure in such cases is just as warrantable as operation for depressed fracture of the skull. Injuries due to direct trauma are apt to be of this character. Sudden forced flexion of the spine is usually the cause of dislocation and fracture of the bodies of the vertebrae.

Laminectomy for fracture or dislocation should be made early. The earlier the better. The longer pressure has existed the more extensive the degeneration of the cord, still hope need not be entirely abandoned in old cases, for laminectomy has relieved many such even after months had elapsed since the injury was received.

To sum up, laminectomy is, *per se,* not dangerous. It represents the surest method of diagnosis of fracture and dislocation, and the most rational and efficient means of relief.

DISCUSSION.

DR. WELLINGTON T. STEWART, Chicago, Ill.—I heartily concur with Dr. Eastman in the advocacy of early operation in fracture of the spinal column. I believe that many a patient has been allowed to die when the chances were that an early operation would have saved his life. I have in mind the case of a young man who was thrown from a horse. The third cervical vertebra and the second and third lumbar vertebrae were fractured. He remained five months in the hospital and then went to Milwaukee, where he lay in the hospital for several months. He was completely paralyzed from his arms down, and it was a surprise to everybody how the young man lived. Five years afterwards he was referred to me by Dr. Strong of Minneapolis. He came to Chicago and I had the X-ray applied, the picture showing a fracture of the cervical vertebrae very plainly and also a displacement and fracture of the laminae in the lumbar region. He was removed to the hospital and laminectomy performed. From disuse his feet were drawn up and he was walking on crutches —practically on his toes. At the operation it was found that pressure on the cord existed from the lumbar fracture, but the cervical fracture had been entirely repaired by exostosis. The symptoms had improved so far that he could retain his urine for one or two hours at a time. In five weeks after the laminectomy was performed he was taken back to the

operating room and a splicing of the tendon was done, which brought the heel down to the ground. He had never put his foot on the ground in five years. Today he is walking with canes, six years after the injury. I believe early operation after the accident would have saved this young man much suffering, and he might have been well today—certainly better than he is at the present time. I believe there is too much conservatism in fractures of the skull and spinal column. I don't believe there would be any objection on the part of relatives, or the patient himself, if the nature of the operation is explained to them, and if the operation offers any show of relief I believe we can always gain their consent, and I believe, as the essayist has said, that it is criminal not to make an attempt to relieve these patients by a laminectomy, or a similar operation.

Dr. Carl E. Black, Jacksonville, Ill.—I want to say a word in emphasis of the sentiment expressed in Dr. Eastman's paper in favor of early operation, or exploratory operation in these cases. I have had some unfortunate results in the treatment of spinal fracture cases which led me to examine the reported cases of injury to the spine. Last year I collected 555 cases of injuries to the spine, from all causes, to compare the difference in the result between those operated and those not operated. Of the 555 cases about 250 were operative cases and these showed 25 per cent. better results than the non-operated cases. I believe it is the duty of the surgeon to at least make an exploratory operation in these cases. Certainly the teaching from these operations made would plainly lead us to that conclusion.

Dr. Thos. H. Manley, New York.—Dr. Eastman's subject is of great interest to all of us, because in these days of advancement along the line of operative surgery the spinal region is one in which we find various types of injury, that offer better results by the sanguinous intervention than by measures formerly in vogue, which were pretty generally along the lines of strict conservatism.

XVII.—SPINAL INJURIES EXTERNAL TO THE SPINAL CORD.

BY THOMAS H. MANLEY, PH. D., M. D.,
NEW YORK.

Progressive study of trauma of the rachidian structures has, of late years, become a subject of more than passing interest to practitioners, because, since the enormous expansion of

every description of railroad traffic in this country and the erection of buildings of great height, the number of serious spinal traumatisms has greatly enlarged.

Structure and Function.—In order to intelligently acquaint ourselves with the character of the primary pathological conditions succeeding rachidian injuries, it is well that an outline of structure and function be briefly considered. At the outset let us note that the spinal architecture in man presents several special and unique characters; hence we must exercise a prudent reserve when we assume to apply the deductions derived from deliberately inflicted traumatisms on the lower animal to grave spinal injuries in the human being.

In man the vertebral column occupies a vertical position resting on two supports. It is a flexible, tubular pyramid, its body being composed of a composite structure without any regularly constituted articulations. About two-thirds of the vertebral column is composed of osseous tissue, and one-third intervertebral substance. The osseous spines and arches posteriorly are jointed.

Although of great strength, the spine is in a large degree elastic and resilient. Within this osseo-cartilaginous cage, securely guarded and deeply buried, is the medulla-spinalis, surrounded by a fluid continuous with the cerebral ventricles through the foramen of Magendie. A ponderous musculature supports and acts on the spinal column. The extrinsic structures have an abundant vascular supply from vessels within and external to the vertebral hollow.

Defences of the Spine.—Although the spine is composed of so many different structures, lying apparently so near the surface, no region of the human body can resist violence with so much impunity; the sudden sinking of the head on the shoulders so safeguards the cervical segment that a serious injury, except by indirect force, is seldom encountered. In the dorsal areas we note the frequent injuries of the shoulders, their appendages and the ribs; or even serious damage to the thoracic contents, but the rachidian structures have escaped.

Nearly every description of abdominal injury have I seen

from violent blows and crushes, but never an associate injury of the dorsal or lumbar vertebrae except in mortal cases. Nothing less than great and direct force can sunder the sacrum or its caudal appendage, the coccyx.

The Spinal Cord.—The vertebral hollow contains the greater part of an organ of the very first importance to life, which is not only a conductor of impulses, but also regulates all the processes of nutrition and governs all vital actions, as from ganglia, directly connected with it, springs nearly the entire nerve supply, general and special. Delicately organized as the cord is, it is endowed with a remarkable tolerance to injury, besides it undoubtedly possesses active regenerative properties. The spinal cord, in the vertebral canal and at the base of the skull, is vastly better protected from violence than the brain proper. The entire cord weighs a little more than two ounces, is pierced by a central canal and is suspended in the subarachnoid fluid, steadied and supported by its roots. Hall has pointed out that all the cranial nerves, except the optic, olfactory and patheticus, have their origin in the bulb; hence, should the brain be removed, even in a warm-blooded animal, life would yet remain, as respiration and the circulation would continue. The cord has a head, a body, limbs, and a tail; all but the first are in the vertebral canal.

Extrinsic Lesions of the Spine.—At first thought, it might seem impracticable or inexpedient, from an anatomical or physiological standpoint, to discuss separately the traumatisms of the cord and those of the parts overlying it, the *extrinsic;* but, as a matter of fact, while central lesions from traumatism, involving paralysis, are uncommon, those of the external structures are comparatively infrequent. My purpose on this occasion will be to touch very briefly on the extradural lesions, chiefly on those which do not manifest themselves by paralysis. These, in their order of frequency, are: First, contusions; second, sprain; third, hemorrhage; fourth, fracture; fifth, diastasis, fracture-luxation; sixth, lesions complicating spinal injuries.

Contusions.—Contusions result from blows, falls or

crushes. A violent blow over the upper cervical areas of the spine may result in serious consequences, for here are lodged the large cervical ganglia of the sympathetic, the roots of the phrenic nerves—the spine is in close proximity to the ganglia of the vagi. In a violent blow the hollow organs of the neck, the pharynx, esophagus, larynx and trachea usually escape damage.

The Effect of the Shock and Contre Coup Force on the Viscera of the Cavities of the Chest, Abdomen and Pelvis.—Disastrous consequences sometimes result from the *contre coup* effects of a blow. Therefore, why, in injuries to the dorsal or lumbar and sacral regions, the organs of the thorax, abdomen or pelvis may suffer varying degrees of disorganization, while the rachidian structures have escaped damage? By this quality of force applied over the thorax, the posterior mediastinal space may be opened, the pleura or lung lacerated, the kidney contused or displaced, the distended stomach ruptured, the pendulous organs, as the liver, the spleen, may also suffer from the effects of the disorganizing force.

Similar effects may occur when the force falls over the loin, notably to the solar plexus, the pancreas or the great blood trunks. In the female, a violent blow over the sacrum may displace the ovary or the uterus, and in any stage of pregnancy induce premature delivery.

The most ordinary effects sustained after spinal contusion is subcutaneous, intermuscular, extra or intra-rachidian hemorrhage. Inflammatory reaction with spasmodic contraction and rigidity of the muscles speedily supervenes. Extrinsic rachidian contusions, while sometimes the cause, severe suffering and impairment in function may be generally regarded as belonging to the minor class of spinal traumatism, where there are no visceral complications.

Spinal-Sprain, Wrenches of the Back.—By sprain, we usually understand an injury of a joint produced by a wrench or a twist; something just short of a tangible fracture or luxation, though it may be more serious in its consequences than either. In the spine such an injury involves several joints. Sprains frequently involve a splitting or clipping

of bone, an overstretching or a rupture of muscle ligaments or tendons. They are often self-reduced luxations; the displaced bones have automatically sprung into place. So-called "sprains" are without doubt one of the most frequent determining factors in serious types of Pott's disease in early life; the finer, deeper structures having sustained damage, while no obvious evidence of it remains on the surface after injury is inflicted. A very severe spinal sprain in the adult may lead to deformity, ankylosis to myotrophic changes in the soft parts and ultimate impediment in function. Moliere well says that, "We may properly observe an attitude of reserve in the prognosis of *entorse,* torsion or violent flexion of the rachidian structures, especially in young subjects, as at a period more or less remote from injury, ankylosis, necrosis or suppuration with symptoms of Pott's disease may set in." He relates an instance which so well illustrates these sequelae that it is here transcribed. "A young man of 23 fell a distance of 45 feet, striking on his shoulder. For months he felt no inconvenience; when, finally, he noted trouble in urinating. Now, anesthesia in the limbs with some pains in the back, set in. After awhile the medullary symptoms passed off, the *loco-dolenti* leaving a well marked projection of the apophyses of the fifth, sixth and seventh spinal vertebrae. He, later, completely recovered his former activity and vigor. Tuffier, Hallion and Gurlt have recorded several similar examples of this class. Chadevergue and Bounet insist, after their experimental researches on the cadaver, that *attachment* straining or tearing of the ligaments, occurs more frequently than fracture, and that in the dorsal region, particularly, it may be often observed, while the interstitial discs and bodies escape damage."

Severe sprain of the cervical segment of the spine, without fracture in adults, is certainly very rare. In the dorsal areas partial fracture, or a non-displaced one, of an arch, or spur, may be often mistaken for a "sprain;" in fact, they often go together. Minor degrees of sprains occur most commonly in the lumbar region; and here is where we sometimes witness an injury which clinically closely resembles the joint sprain of a member.

Fortunately at this point the medulla has broken up into a leash of independent trunks—the cauda-equina. The canal widens and the rachidian column begins to broaden, as it reaches the sacrum; here we note a larger degree of motion; the lateral costal supports being absent, a considerable degree of lateral and rotary movement is permitted. In fact, we may regard this bond as the *lumbar neck* of the spine, inasmuch as it unites the thorax with the pelvis, and moreover, within certain limits, allows of all the movements of the cervical isthmus.

A serious sprain may result here, from a sudden and violent bending backward of the trunk on the hips, or from an acute lateral flexion. The simple, common sprain in the "small of the back" most frequently follows from attempting to support great weights on the upper dorsal parts: raising heavy loads in lifting, the performance of difficult acrobatic or gymnastic feats. The patient is at once seized with an agonizing pain in the lumbar muscles; he is bent up and only moves with great pain. He quite invariably will say that he felt something rupture; and no doubt there has been a giving way of some of the supporting structures, with an extravasation of blood into the intermuscular spaces. In some cases the deep nerve roots have suffered from over tension, and hence neuritis follows. Mothe and Siedellot regard this type of sprain as dependent on rupture of muscles, while Lieutand and Ponteau believed it was caused by dislocated muscles or tendons. In 1873, Martin of Lyons wrote at length on spinal sprains, dealing fully with its etiology, diagnosis, pathology and therapy. He agreed with Ponteau in the luxation theory, alleging that this was invariably attended with widespread muscular spasm, which produced marked flexure, or even lateral spinal curvature. Savery insisted that in various cases of severe spinal sprain, though the subject might be about soon at his usual occupation, insidious pathological changes may be in operation, which may ultimately lead to possible serious central diseases or great impairment to the action and strength of the back. This injury may be inflicted while the individual is in an

emotional state, when he remains quite ignorant of the severity till the following day or even much later.

This important feature of these cases was well brought out in a case coming under my observation three years ago. The patient was a young man 30 years old when I saw him in consultation with Dr. James Moran of this city. He was a hearty, vigorous person, a brick-layer by occupation, who was injured in a railroad accident a week previously.

History of Case.—On a Sunday evening, a week before, the patient was in a crowded open trolley car on his way home from the seaside. He was standing with a firm hold on one of the uprights at the end of the seat. The car was moving on a down grade with great speed and about to enter a curve, when another car just ahead came in view. The motorman quickly set the brakes. A collision was inevitable. When the clash came, the man held to his post, but the motion swung him over to the seat ahead and threw him on his shoulders, down by the roadside under another passenger. An ambulance was soon called, but as he only felt a violent shaking up, he refused to be taken to the hospital and made his way home. Soon after he had free vomiting with great pain in his back and just below the shoulder blades; but regarding his injury as only a simple sprain. Domestic remedies were applied and he remained quiet. On the fourth day he called Dr. Moran. Three days later I was called in. At this period both his general condition and the local state of the back, pointed unmistakeably to severe spinal injury. At the lower dorsal region, the parts were tumified and discolored. The muscles marked by severe spasm, and the body so bowed as to give him the most relief. There were no medullary symptoms. It struck me as an ideal instance of severe extrinsic injury, and so I declared it.

After six weeks rest he so far recovered as to be able to walk about, but movements of the body, except in a bent position were painful. After six weeks he had quite recovered, except for a well marked limitation of movement and strength in the back. Now, a well marked kyphos had formed the projection including the last dorsal, the first and second lumbar vertebra.

Second Case.—Fracture of Right Clavicle with Cervical Sprain.—Patient 32 years old, driver of ice cart. Was injured on May 12, 1902, by being thrown out, while intoxicated, striking on his right shoulder and side of the head.

Sustained fracture of the right clavicle near the middle. The day after admission to the hospital he complained of a sense of numbness in both hands with muscular weakness. On left side anesthesia extended up as far as insertion of the deltoid. Pain with rigidity of the muscles compelled him to keep the neck in a flexed position. After nine weeks the cervical segment had recovered from the painful rigidity and sensory paralysis and passed off in the right fore-arm, but some numbness remained in the left fore-arm and the grip of the hand remained very feeble. Over the spines of the sixth and seventh cervical vertebra there yet remains a well marked tumifaction exceedingly sensitive to pressure of manipulation.

In this later instance, of clavicular fracture, with spinal sprain rfom a fall, it is evident that the fall on the shoulder spared the spinal-cord from more serious damage. When fracture of the clavicle occurs through the outer third of the shaft we sometimes note varying degrees of impaired function in the arm, resulting from the brachial plexus being crushed or pressed upon by the fragments, but in this case, palsy was most intensified on the left side which pointed to a central lesion and not one of the brachial nerve-cords. I may add, that in this instance, the patient suffered for three weeks most intense pain, from the fourth cervicle down to the first dorsal vertebra, and there was marked rigidity and intumescence of the overlying parts.

Spinal Hemorrhage—Extra-Dural.—There is no variety of traumatic hemorrhage, about which more confused ideas prevail, than that which so often follows various severe spinal injury. The usual conception of it is so vague, that but few really appreciate what its full meaning implies. Nature abundantly provides for the "man who carries the load," for that column which supports every organ and structure of the body above the femoral crutches. The parenchyma of no organ of the body is more abundantly supplied by the vascular tide than are the rachidian structures. Arterial blood pours into the overlying structures of the cord from every direction and the intrarachidian plexus of veins is very capacious. The cervical segment of the cord derives its arterial supply quite exclusively from the large descending divisions of the vertebral, the dorsal from the intercostal, which subdivides into three branches, (a) an anterior, which ramifies

over the vertebral bodies; (b) a posterior, or retro-dural, which splits up the walls of the spinal canal, anastomosing with the like arteries from above and below; (c) a middle, or medullary, which pierces the sheath of the dura mater, to enter the cineritious substance of the cord, anastomosing the anterior spinal in front and the posterior behind. Branches of the lumbar arteries, eight in number, supply the vertebral bodies and ligaments only. Large branches from the internal iliac abundantly supply the sacrum, its nerve trunks and the coccyx. In no other region will we discover so free anastomosis between the large arterial and venous capillaries. So keenly alive are surgeons to this anatomical fact that they are always impressed by a salutary dread when they essay to expose the spinal cord, for no other organ in the body is more inaccessible to the scalpel in the event of an excessive vascular leakage. Victor Horsley sets this down as one of the greatest dangers of laminectomy. A plexus of very large veins courses freely over and under vertebral walls. Zappy said that intrarachidian veins, when fully distended, occupy quite one-third of the spinal canal.

On the Usual Situation of Spinal Hemorrhage.—Over the cervical areas the deeper tissues are a veritable sponge, much like the cavernous, for vascularity. In my own first case of laminectomy for fracture, before the shattered arches could be removed—fifth and sixth—in spite of all possible haste and provisions to effect hemostasis, our patient was nearly mortally blanched; and yet, paradoxical as it may seem, in no other organ of importance do we discover so inadequate a vascular supply as in the medulla-spinalis itself. In this respect, as in so many others, does this structure differ from the brain, a continuation of which it practically is.

From the foregoing it is therefore manifest that in the infliction of great violence to the spinal pyramid, some type of hematorrhachis, rather than hematomyelia, must be, by all odds, the most frequent; or, in other words, it is rather extrinsic than intrinsic bleeding. This holds good of the lower lumbar and sacral terminus, peculiarly where the cord has broken into large trunks, and hematorrhachis or hematomeningia

only, can occur. In this connection the high vascularity of the coccyx and Luschka's gland is noteworthy. Of hematorrhachis we have three types. First, into the intermuscular planes, extra rachidian. Second, into the spinal canal—intrarachidian. Third, intra- and extra-rachidian combined.

The first is the most frequent and insignificant in its effect; the second, epidural, when sudden and of large volume, is always a much more serious event; the third is seldom

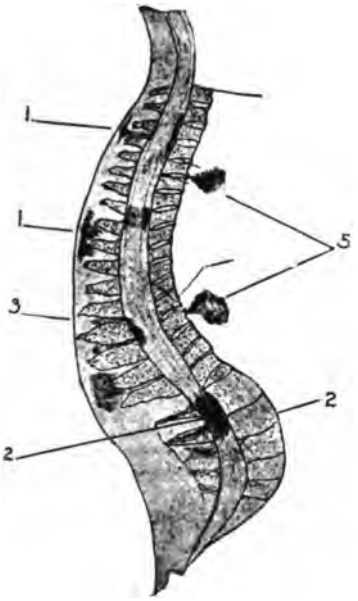

Fig. 1.

Spinal hemorrhage types.

1. Extra rachidian.
2. Intra rachidian.
3. Intra and extra rachidian.
3. Hemato myelia.
5. Intra thoracic and abdominal.

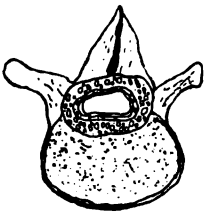

Fig. 2.

Circulation in the rachidian canal.

Fig. 3.

Comparative capacity of venous and arterial circulation.

witnessed, except with association with fracture, severe contusion or sprain.

The pathological effects of hemorrhage are, first, the drain on the circulation; second, by acting as a foreign body, inducing pressure, thereby inhibiting function; or, by its presence, provoking inflammatory or degenerative changes; the latter effects only are in operation after extrinsic spinal traumatism. The composition and functions of the spinal hollow

are not such as to favor large hemorrhage. Hemorrhage into this tube is usually venous and hence passive. There is no torrent. The blood coagulates slowly here, and There is no torrent. The blood coagulates slowly here, and often imperfectly, being of a tarry consistence, rather a firm clot. Bichat estimated the capacity of this canal, with the cord in situ, at a hundred and seventy cubic centimeters.

What part sanguinous pressure exercises here, *per se,* as a compression agent in impeding nerve conduction, is not definitely determined, because in many instances there have been other associate etiological factors in operation, of which the blood leak is, in a large measure, but a consequence. There is but a very little analogy between this type of hemorrhage and intracranial, because of the wide contrast in the anatomical arrangement and structure of the vessels.

The most usual site of severe traumatic hemorrhage is extra-dural. In fractures of the spine and other forcibly induced injuries of the rachidian structures, on anesthesized animals—dogs and cats—I saw no single instance of large intradural hemorrhage, on autopsy, except when fracture was present. In one case, it was at first supposed that there was no fracture, but on removing the vertebra-column one was discovered extending through the body of the seventh dorsal vertebrae. In nineteen autopsies, those dying from spinal injury fracture, accompanied by extra dural bleeding, in all cases a fracture co-existed. It is doubtful if the cord, or any section of it, can be strangled and its functions suppressed by an effusion of blood external to the dorsal envelope. But, after the membranes or medulla itself have suffered from violent tension, torsin or contusion, a large hemorrhage then greatly aggravates existing conditions, giving rise to grave complications, by the immediate suppression of function, or by exciting an ascending meningitis or myelitis.

From the comparatively frequent occurrence of cerebral hemorrhage in cranial traumatisms, we have been led, too often, to assume the existence of "spinal apoplexy" after injury, and that the bleeding has been into the substance of the cord rather than external to it. This was what I looked

for in my early hospital experience, in autopsies, on those who had succumbed from violent injuries of the spine.

In 1893, I published notes of fifteen autopsies on this class, besides on fifty-five cases of spinal injury which recovered or remained paralyzed. My views on the subject then were as follows:

"I have never met with a single case, on autopsy, which gave conclusive demonstration of a free hemorrhage, which was exclusively limited to the spinal marrow, or sub-dural space, in which the leakage was of sufficient volume to seriously threaten the integrity of the cord by immediate pressure, or to excite consecutive inflammation. On the contrary, in all my cases of spinal hemorrhage, in which *post-mortem* examinations were permitted, the blood escape was external to the theca; extra-dural.

"We can seldom have extra-vertebral hemorrhage pressure as an independent factor in spinal injuries. When such does exist, it is always in association with either fracture or dislocation.

"Hemorrhage into the spinal canal—extra-dural—as a source of meningeal inflammation, or medullary compression, in traumatisms of every description in point of frequency, vastly preponderates.

"The physical quality of this pressure is hydrostatic; anatomically consisting in most cases of arterial blood, in a fluid or coagulable state.

"The ultimate fate of one, the subject of traumatic spinal-hemorrhage, will depend on verious factors, the most important of which will have reference:

"1. With respect to situation and extent.

"2. The suddenness of its onset, or its insidious development.

"3. The general condition and complications."

My experience since that time has been along the same lines. It has been a source of much gratification to me to have learned that most surgeons and pathologists quite generally agree that hematorrhachis and not hematomyelia is the dominating vascular lesion here. Dr. Seymour Sharkey goes

so far as to say that there is no case on record of death from a primary hemorrhage into the medulla-spinalis. Charcot expresses a doubt that such a condition ever existed, and be lieves such hemorrhage only occurs after the softening or consequent on myelitis. In those examples of large and sudden mixed bleeding into the spinal hollow, grave symptoms may quickly supervene.

In a case published by Mellor, after a fall from a cherry tree a man was soon paralyzed. He had great pain in the neck on movement. On the seventh day a bed sore appeared. In three months, complete recovery. Hoch gives an example of the less acute type. His patient fell about ten feet, striking on his back, got up, no immediate trouble, but three weeks later was seized with severe pain between the shoulders, and contraction of the brachial muscles, and later had paraplegia. Recovery, with some paresis of the arms remaining over a long period. In another instance, a man fell from a train in motion, but apparently sustained nothing more than some slight bruises. On the night of the seventh day he awoke to find complete paralysis of the right side. Later, recovery was complete. Reynier and Lepine have published some remarkable examples of the acute and consecutive varieties. In May, 1900, a young man came under my care, who had of late fallen about fifteen feet, striking on his head and shoulders. In great shock, when he was brought to the hospital; quite complete motor paralysis, with loss of the patella reflexes. Had to be catheterized. On the second day temperature 104 degrees F., pulse 110. Great pain between the shoulders, right arm drawn up over the chest, and rigid. After ten days, amelioration of all his symptoms set in, and on the thirty-second day he left the hospital quite fully recovered. In some of these cases, it is highly probable that there is a small subdural hemorrhage, coincident with the external. Bastian supports the view that intradural hemorrhage is rare here; this, he thinks is because of the consistence of the cord, as compared with the brain, and the richer supply of connective tissue around the blood-vessels. Gowers regarded severe hematomyelia as rarely pri-

mary and never traumatic. Erichsen divided spinal hemorrhage into three types: the first into the canal, the second into the theca-spinalis and the third into the cord; the latter never, except after very grave traumatism, with fracture.

M. Lambert of Lille saw a man who that day had sustained a violent spinal injury in the upper dorsal region, with paraplegia and complete loss of the reflexes following. It was intended to operate the next day to relieve what seemed to be osseous pressure of the cord, but he died the same night of bulbar paralysis. On autopsy, only a simple extradural effusion of blood was found, extending from the third to the fifth cervical vertebra. There was no visible alteration of the cord or bulb. From the autopsy findings in this case, this author is led to believe that acute hemorrhagic compression of the cord is ample to produce paralysis or death, without any serious structural alterations in it.

In conclusion, we may summarize that extrinsic rachidian hemorrhages appear in the form of, first, intermuscular effusions of blood or hematoma, succeeding laceration of muscle, cleavage of bone or rupture of ligament. Second, intra-rachidian hemorrhage from rupture of the larger intradural plexus of veins. Third, a co-existing hemorrhage from the large connecting vessels lying between extra-vertebral and the rachidian plexus. Fourth, non-complicated, intra-rachidian hemorrhage is seldom the cause of grave central lesion; in the moderate type, recovery is the rule. Meningeal or medullary hemorrhage, all authorities agree, can rarely occur as a primary lesion, after trauma, except in the event of fatal destruction of the medullary elements.

Extra-dural hemorrhage is seldom a cause of inhibiting function, except when sudden, primary and of large volume. In the lumbar or sacral segments, hemostatic pressure—hematorachidian—seldom operates alone as an inhibitory influence on the nerve-cords, as in this situation the intervertebral apatures are so large as to permit of a free sanguinous escape into the loose connective tissues, along the lateral and posterior walls of the vertebrae; hence in this situation concentrated and prolonged compression is quite improbable. We are justified in

regarding spinal hemorrhage as devoid of grave significance under all circumstances, with rare exceptions. It is, therefore, only when intra-rachidian hemorrhage exists as a complicating factor, that it may be a cause of serious apprehension.

Spinal Fracture.—Apophyseal and "Broken Back." Spinal fracture presents so many unique and striking features that it should be always considered in a separate category. The subject becomes more simple and comprehensive if we would more critically examine into the anatomical architecture of this triple-curved hollow osseous tube. Its dominant characteristics are its strength and its pliancy; in virtue of the latter, its axis and angles may be altered, it may be bent

Fig. 4.

Apophyseal Fracture Dorsal Region—Multiple and Depressed.

Fig. 5.

Fracture of the Arches—Cervical Region.

within certain limits and be rotated without any marked diminution in the diameters of its canal.

Although the current works on anatomy describe the spine as made up of a chain of vertebrae, of separate independent links, something apparent enough in the skeleton, but when we examine the body of the spine as a whole, with the soft parts *in situ*, we will do well to note that the segments, the so-called bodies, have no joints, no synovial investment, no interarticulate cartilage and no ligaments. Each segment is separated by an ill-defined structure, known and

properly designated as "intervertebral substance." This occupies fully one-third of the entire length of the spine. It is neither bone nor cartilage, and yet histologically contains the elements of both. It resembles embryonic or immature osseous structure more than anything else.

Passing down anteriorly, and laterally, is a broad, thick envelope of fibrous structure. It is defined as the "anterior ligament," but it serves other important purposes than a ligament. It passes down over the anterior and lateral aspects of the osseous blocks of bone; it also invests the inter-

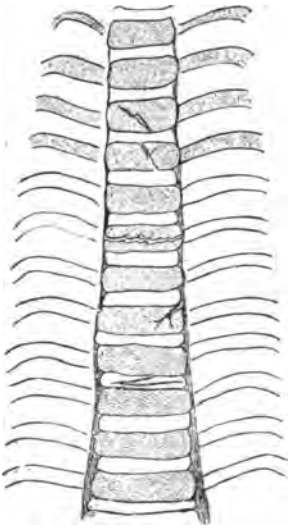

Fig. 6.

Fracture through the bodies, with rupture through the discs.

vertebral substance, as a periosteal sheath. Laterally its fibers pass posteriorly to interlace and fuse with the "posterior ligament." Taken together, these two interwoven ligaments may be regarded as the *epirachidian sheath*, serving at once the double purpose of a periosteal investment and a lining for cavities. We may, then, without any violation of anatomical truth, regard the entire series of vertebral bodies, except possibly the atlas, as one continuous structure, "the back-bone." Attached or continuous with the osseous blocks posteriorly are the apophyses, the arches and spines, which

enclose the cord and give attachment to muscles and ligaments. Here, and here only, do we find true ligaments. In a considerable number of cases of fracture of the spine, it has been sundered of the osseous stage-work of the rachidian column. This osseous framework posteriorly is essen-

Fig. 7.
Spinal Arches removed, cord obscuring vertebral bodies.

Fig. 8.
Laminectomy showing cord in position.

tially but an *appendage* of the backbone, to envelop the cord. The osseous structures of the spine are so deeply lodged, so limited in their range of movement, so firmly held by tendons and bound together by ligaments, that when a fracture occurs there is seldom any palpable displacement, and hence

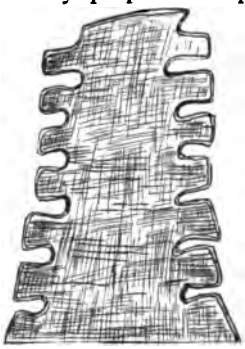

Fig. 9.
Removal of posterior ligament.

it often defies detection. It is difficult to diagnose in life, and may elude detection after death. In the greater number of instances, there is an absence of crepitus, no immediate deformity immediately after injury, nor is function of the

cord in abeyance, except in very grave cases, where the peripheral ganglia are involved, or the cord is crushed. The X-rays often fail to clarify matters. They cannot well be described as a primary aid. Of this means, Dunn well says: "It is not always possible or desirable to resort to the X-rays at once, but sooner or later great aid may be obtained from good skiagraphs in many cases. Nor will the rays prove infallible in diagnosis of these injuries. They are only a great aid in most cases, and it requires very expert work to make skiagraphs of the spinal column that are of much value. They are perhaps a greater service in certain gun shot injuries where the ball has lodged in or about the vertebrae." Even the exploratory incision will fail to elucidate matters if the fracture is through a vertebral block. Nay, it may

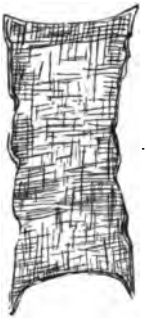

Fig. 10.
Removal of anterior ligament.

Fig. 11.
Section of cord removed.

err when the more accessible pedicle or arch is shattered!

A case came under my care in March last—1902—illustrating the almost insurmountable difficulties in the diagnosis of spinal fracture. A young man of 31 sustained a fall of 35 feet from the elevated railroad, on the 12th of February, 1901. He was immediately brought to the hospital with paraplegia. Here it was supposed that a luxation existed ,and several vain efforts at reduction were made. A week later he was entered at another hospital; there a surgeon, who is among the pioneers of laminectomy, made an exploratory incision over the mid-dorsal region, assuming that there was a fracture at this site. Now, after more than a year, a well-marked kyphos has formed, consisting of the

eleventh and twelfth dorsal and the first lumbar vertebrae. And at present the areas of palsy point to this as having been the primary seat of medullary lesion.

In fracture, only involving the extrinsic parts, diagnosis is not infrequently quite impossible by any safe or justifiable procedures. In my experimental researches on spinal traumatism, it was repeatedly demonstrated that the arches might be cracked in two, or the bodies split in various directions, without a single central symptom supervening. Therefore, judging from analogy, one may often assume the probable presence of a fracture of the spine in man, after a violent injury, even though no positive evidence exists from the clinical aspects of the case; from all of which we may conclude that a "broken back" occurs more commonly than is gen-

Fig. 12.

Concealed fractures of bodies, exposed by detaching sheath.

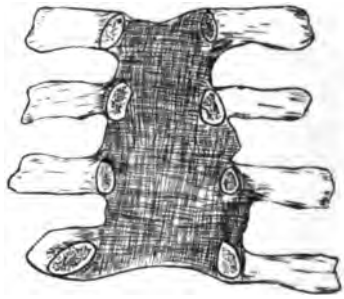

Fig. 13.

The posterior common ligament after the removal of the arches and cord.

erally assumed; and, moreover, that it seldom menaces life, unless it seriously involves the cord; however, deformity and impediment in function may succeed.

At the International Medical Congress at Rome in 1884, the following was my summary on the topic of "Diagnosis in Spinal Fracture"; First, fracture of the spine has no well defined symptom; second, in the majority of cases there is neither abnormal mobility, displacement or crepitus; third, experiment proves that the bodies or the apophyses may sustain multiple fracture without neural manifestations resulting; fourth, in those cases involving the medullary structures, the extent of crushing is often great and permanent

loss of function is liable to follow; fifth, the exploratory incision over the rachidian areas is fraught with danger and is never warranted here as an aid to diagnosis."

Violent manipulation in reduction of the fragments is to be deprecated, as it is quite certain to aggravate pre-existing conditions. LeGros Clark records an instance of a young man impaled on the pickets of a fence, the injury quite limited to the sacrum; the spine seemed nowhere else injured, but after death a fracture of the second dorsal vertebra was discovered.

Jacobson saw a man in whom he diagnosed a fracture of the first and second lumbar vertebrae. There was loss of power in both extremities. Paralysis passed off, and in a few days the man returned to work. He was killed by an accident a week later. Now, on autopsy, this surgeon discovered that only the first lumbar vertebha had been fractured, but this was shattered, and somewhat displaced. Many of these fractures point to the surprising degree of tolerance of the cord to many varieties of pressure. In Cloquet's celebrated case, though the atlas was resorbed and the odontoid process projected into the foramen magnum, with pressure on the bulb, at no time in life was there any paralysis. Erichsen warns us not to forget that in a cervical region a fracture may be mistaken for a sprain, and that want of proper precaution may lead to a sudden displacement, with consecutive medullary pressure and death.

Gunshot and Punctured Fractures (*compound fractures*). —Gunshot and punctured fractures in the spine belong to the open variety and hence, from their nature, we will anticipate the dangerous complications of infection here. The propriety of including these with extrinsic lesions might be questioned, as the cord is often implicated, though not uncommonly there is no clinical evidence of it.

I have found, in the lower animals, that we may lacerate the cord with the needle point, or even make a small incision through the long axis of it, without any paralysis following. This is another evidence of the spinal marrow's tolerance of trauma; and from well authenticated cases published, we

may believe that in man the same phenomenon obtains, Kirmisson removed with difficulty the broken blade of a pocket knife, 6 cm. in length, which had been driven in between the seventh and eighth dorsal vertebrae. It was so fixed that a deep section had to be made before it could be dislodged. No unpleasant symptoms followed extraction. In another case, reported by Giss, a blade 7½ cm. long was broken off after being fixed in the cervico-dorsal space. On the fourth day it was dislodged with difficulty. This was followed by the escape of cerebro-spinal fluid. There was no paralysis and the wound healed well. In Joubert's case the blade entered between the sixth and seventh cervical vertebrae, engaging in the intervertebral disc. Some symptoms of meningeal inflammation followed, but there was no disorder of function.

Recent observations in connection with intrarachidian cocainization quite conclusively prove the comparative inocuousness of a single or repeated accepted puncture of the meninges or medulla-spinalis. Just how the small modern missile in recent warfare affects these parts we can only determine when the surgical histories of the wars in the Transvaal and Philippines are written.

Simultaneous Nerve Lesions; Mode of Repair and Ultimate After Effects in Spinal Fracture, Not Including Paralysis. Apophyseal Fracture.—Vertebral fracture may be anatomically divided into two classes; the one most frequent, apophyseal, involves the arch or its constituent parts. It is quite generally induced by direct violence, by blows or falls.

Fracture of the vertebral bodies or diastasis of the intervertebral cartilage, the second variety, is confined to a sundering of the vertebral bodies, or a rupture through the intervertebral discs, a disorganization of the serpentine chain; in a word, it is a "broken back." This is produced by a sharp bending of the rachidian coil, or a twisting movement —torsion. In this fracture, the thick investing sheath may or may not be lacerated, and the apophyseal ligaments are either overstretched or torn through. We will sometimes

see instances of impacted vertebral fracture in the cervical region wherein we will discover the vertebrae telescoped into each other. This class is of a mixed character, the bodies and apophyses sustaining simultaneous shattering.

Nerve Complications.—It has been noted that the madulla spinalis presents marvelous resistance to trauma, to overtension, bruising or pressure. Besides, on careful examination of the nerve roots, before and after they have passed through the vertebral forama, in apophyseal fracture, they will quite invariably exhibit evidence of laceration or contusion. Pain and atrophic changes are the dominating clinical symptoms of cord and nerve lesions in vertebral fracture, as in practically all severe traumatisms here which do not seriously involve the cineritious tissue. The meningies

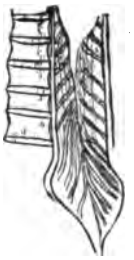

Fig. 14.

Lumbar segment—Cauda equina.

at the site of injury take on inflammatory changes; there is congestion, with a plastic or serous effusion, which, however, fails to penetrate the pia mater and evade the cell elements of the cord. This is manifested by pain, hyperesthesia and myotrophic changes. The ganglionic nerve roots, the posterior, are by far more susceptible to the effects of trauma than the anterior roots, the motor. Hence, we will note so frequently after spinal injuries various phases of sensory disturbances, numbness of the parts supplied by a certain nerve root, or, what is most frequent, heightened sensibility over the point of injury, always aggravated by motion, and marked trophic changes in the areas enervated. The motor nerve roots in many of these cases are quite unimpaired in function, until trophic changes are well advanced; in very

aggravated instances the motor nerves of various parts will respond to electrical stimulation when sensation is quite totally abolished. We must, therefore, assume in a considerable number of cases of spinal fracture, that even though paralysis be absent, the cord and its roots have suffered damage with trophic effects on the muscles, on gangular function, on the general nutrition of the body, and on the sympathetic system.

Ollier, in his great work on osseous regeneration, has pointed out that the repair or regeneration of bone is not governed by the same laws, at different epochs of life, or in various regions of the body. When we come to examine

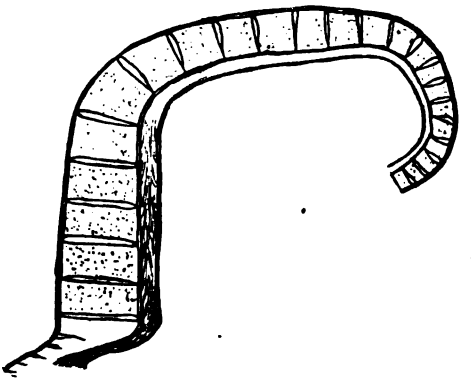

Fig. 15.

Sharp cervico dorsal and lumbo dorsal, posterior flexure. The spinal canal preserving its uniform diameter.

into the composite anatomical structure of the spinal framework, its histological elements and its functions, we can readily understand why we should anticipate here, in the process of restoration, peculiarly unique phenomena. Anatomically, we encounter nothing in the spine which corresponds with a bone shaft, no medullary space or large deep lacunae in the vertebral bodies for the penetration of large nutrient arteries. The continuous periosteal investment of vertebral bodies and discs, like the osseous investment of the dura mater, possesses the property of aiding in osseous repair after fracture, but none of regeneration. Repair after apophyseal fracture—simple non-displaced and non-compli-

cated—is rapid and practically perfect. But in fracture through bodies or cleavage through their discs of cartilage, alone or complicated, the quality of repair is not the same, in a considerable portion of cases. Here we find different influences in operation. The fractured spinal bodies, through rupture of their sheath and ligaments, are loosened, and the superincumbent weight from above tends to press them out of position; the steady strain from muscular traction on the apophyses posteriorly tending always to so draw them backward that the resulting concavity is directed anteriorly. The intervertebral disc tends to partial or complete absorption, or osseous transformation and fusion with the bodies. In order to provide for the strain placed on the damaged column after fracture, nature supplies a massive, osseous exudate, which welds into one mass the whole disorganized areas. The strength of the pyramid it restores, but its mobility is lost and deformity of a permanent character frequently remains.

Spinal Dislocation by Diastasis, Luxation-Fracture.—A typical dislocation at any articulation, implies that two opposing surfaces of bone have completely separated from each other. In the spinal column this can only occur in the apophyseal joints, as the vertebral bodies are essentially but a constituent part of a structure devoid of a true articulation, hence a so-called dislocation cannot occur there; but instead a diastasis, a displacement or a fracture, the line of separation being through the intervertebral substance, its osseous attachment, or through the osseous body itself. In any event, or in whatever light we may regard this lesion, all must concede that a total vertebral displacement is quite impossible without complete crushing of the cord.

Apophyseal luxation is very rare in severe spinal injuries, and is almost invariably complicated by fracture. I have never seen an instance of it, except in association with fracture, even in mortal injuries; and, in a series of experiments on an anesthetized animal, I could only produce it in association with fracture, or in other words, could only effect a fracture and luxation simultaneously. We can only have a complete or incomplete luxation in the apophyseal or costal

articulations of the spine; a dislocation of the vertebral end of the ribs may occur, though I have never seen one recorded.

As the sum total of this phase of vertebral injuries, it becomes clear that in order to be comprehensive and logical, to accurately describe the true character of osseous disorganizations of the rachidian pyramid, we should relegate to oblivion the ancient term "dislocation of the spine," and substitute therefor the term, "diastasis or fracture-luxation."

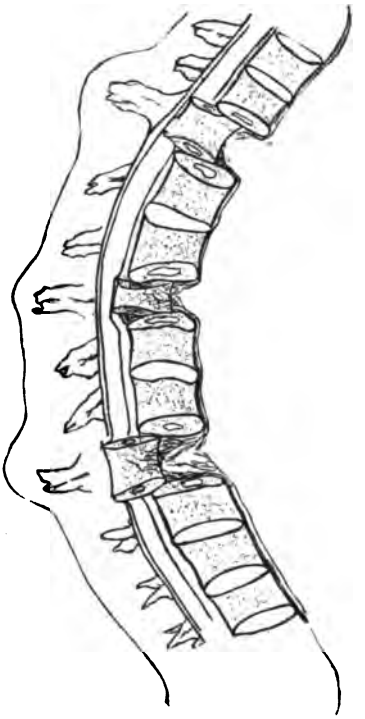

Fig. 16.
Diastasis and displacement of the bodies.

Spinal displacement or distortion, on the contrary, is common enough after various pathological conditions, as well as severe injuries. A recent able contribution by Drs. Painter and Osgood of Boston, Mass., has been published, significant because the authors have broken new ground in nomenclature. They report, "four cases of spinal displacement or cyphos, after injuries, without tuberculosis or other diseases of the vertebrae, in which there were symptoms of pressure

on the cord, which pressure symptoms were relieved and the patients entirely recovered, functionally, in the course of a few months after treatment with plaster or leather jackets was commenced." Fourteen other collected cases are included in this instructive report, all traumatic; the most striking feature in the essay is the author's views of the etiology of deformity. It is no longer a deformity, consecutive to fracture or dislocation, but "rupture of the spinal ligaments." The cyphos in all these cases appeared at a distant period after injury, which is the rule after severe sprains, but in most of these cases of secondary hump, there is previously osseous injury or diastasis as well. Sir Ashley Cooper saw a case of

Fig. 17.

fracture in the fifth lumbar vertebra, with the hump appearing several weeks later; there was no paralysis. A large number of such cases are on record. The pathology of deformity, as viewed by the Boston surgeons, no doubts rests on sound basis, as damage to the ligament is one of the cardinal etiological factors, and "displacement" is a much more accurate designation than "spinal luxation."

Bennett cites an instance, setting forth the possibility of error in the diagnosis of vertebral injury. His patient sustained a fall, resulting in "apparent luxation of the sixth cervical vertebra." This was accomplished by the unconscious

state. Patient soon sank. On autopsy, a fracture through the vault of the skull was found, with rupture of the middle meningeal artery. There was no luxation nor any injury of the cord.

Some of the Complications and Sequelae of the Spinal Injuries Not Primarily Involving the Cord.—The cervical segment of the spinal column lies posterior to hollow passages. In the severe injuries, here, while life may be immediately jeopardized through the concussive impulse communicated to the cardiac or respiratory centers, yet, except from the effects on the rachidian centers themselves, no consecutive, troublesome visceral complications are liable to follow. As we descend into the thorax, we at once appreciate the im-

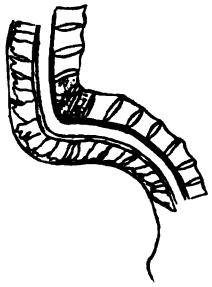

Fig. 18.
Traumatic cyphos uniform diameter of vert. canal.

portant relations subsisting between its contents and its posterior vertebral wall; we will note that the organs and structures of this cavity are in very close relation with it on either side. In the abdominal cavity, behind or below the midriff, resting more or less in immediate contact with the body of the spine, are the kidneys, the great blood trunks, the thoracic duct, pylorus, the duodenum and the distended stomach. The liver, pancreas and spleen have other interposing structures between them and the spine. It is well to remember that the upper pole of the kidney and the upper surfaces of the liver or distended stomach may extend to a level of the eighth or ninth dorsal vertebrae under the diaphragm, and hence, although these are abdominal organs, they may suffer in cases of violent concussion of the lower thoracic vertebrae. The thorax is so constituted as to resist concussive force with remarkable impunity, its pneumatic sacs receive

and distribute violent blows; besides we will note posteriorly that the tips of the spinous processes are inbricated, look downward, and are usually below the convexity of the ribs, which are so often the seat of fracture after a fall on the side or back. This arrangement provides a powerful defense of the spine. In injuries produced by great backward flexion or torsion, involving disorganization, rupture of the ligaments or spinal diastasis, the contents of the thorax may become involved. I discovered in several instances on autopsy, after induced violence on the thoracic vertebrae of animals, that the posterior mediastinum and pleura were often open, with freee hemorrhage into the parenchyma of the lung, the laceration in some cases extending into the pleura, with marked hematothorax following. In some instances pleurisy had developed, and adhesions had followed. These complications occasionally occurred in cases wherein the functions of the cord were undisturbed.

The lumbar segment contains only large nerve trunks, and hence, after great violence is sustained by the rachidian structures, the effects of complications may be more serious than those to the spinal structures. The spine may be "jack-knifed" in this situation, the fixed organs are caught under the midriff and crushed against the spine, the kidneys suffering most frequently. After violent concussive forces sustained over the lumber region, the solid or hollow organs of the abdomen, a pregnant uterus, a distended stomach, or bladder, or other viscus may suffer from *contre-coup* force—from transmitted shock.

I have seen a case of nearly fatal hemorrhage from the left kidney, following a blow over the upper lumbar segment. The patient was a laborer, struck in the back by a large fragment of rock in a blast. Great pain in the back followed, with alarming hematuria. Blood flowed in a steady stream from the bladder, so copiously that the house surgeon sought to subside it by tying a string around the penis, which only led to great vesical distension. After a time, by the use of a frigerant and astringents, the bleeding ceased. It may be noted here that in this case there was no paralysis. It was more than

a month before the man could leave the bed, and so much soreness and stiffness in the back remained that it was nearly a year before he could resume work as a laborer.

The late Dr. B. A. Watson discovered on the bodies of dogs, subjected to induced spinal injuries, the following most frequent complications: First, hemorrhage and infarcts into the lungs; second, laceration of the kidneys, liver and spleen; third, rupture of the great blood vessels, intestine and bladder.

Lyons of London records a case of a man crushed under a

Fig. 19.

Position of the cord. Relation of the cavities.

wheel. No marked paralysis, had puffiness over the ninth and tenth dorsal vertebrae. This was followed by pneumothorax and expectoration of blood. Erichsen has published seven instances of severe thoracic lesions, following rachidian injuries, wherein no evidence of medullary lesion existed. These cases he found generally recovered. Butler saw a severe case of spinal injury after a fall. Patient suffered great pain in the back, but no palsy. Whole left chest bar-

rel-shaped and hyperresonant; succussion elicited a splashing sound. Hollkopf believes that injury to the nerve structures may be a remote cause of tabes and says: "E. Schulze was the first to speak of tabes with traumatism as an etiological factor. Later on, Petit, Ferry and Strauss collected quite a number of partly new, partly previously published cases, in which traumatism preceded the development of tabes. I myself was years ago called to a woman whose right leg was amputated after a severe trauma with considerable tissue destruction. The patient sent for me on account of severe lancinating pains in the left leg and in the stump, which

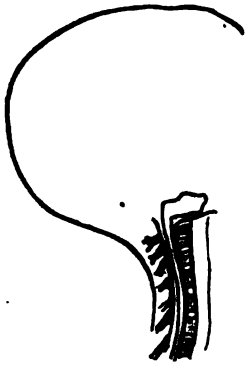

Fig. 20.
Position of bulb.

set in several months after the amputation. At first sight of the patient I was at once struck by the pin-head pupils, as they are usually observed only in tabetics. Upon further examination it was found that she also suffered from diplopia, dysuria, girdle sensation, analgesia and anesthesia; in short, I was able to observe the entire pathological picture of tabes." A young man came under my care five years ago for the treatment of an injury in this mid-dorsal region, resulting from being struck by a baseball. The blow knocked him down. Severe pain over the site of injury succeeded, and two weeks later he began to cough up blood. Between the scapulae there remained a wide-spread intumescence, exquisitely sensitive. After a month's rest he quite recovered and

returned to his place as a clerk, complaining only of shortness of breath on active exercise.

Finally, when we recall the intimate relations existing between the ganglionic structures of the brain and the spinal medulla, both direct through the reflexes and the sympathetic system of nerves, it is obvious enough when, in many varieties of serious traumatism, which either directly or indirectly involve the rachidian mechanism, the intracranial contents manifest signs of disordered function. Let us designate the condition neurasthenic, hysterical, or psychical, or what we may, but whether the predisposition to cerebral disturbance existed before the traumatism or resulted from it, remains yet undecided. Sometimes the sundering of a bone may constitute the least serious pathological state following a fractured limb; the damage to the overlying soft parts, the nerves or blood vessels may be a much more serious matter than the osseous injury. And so in severe rachidian traumatism let us not concentrate all our attention on the spine to the exclusion of important circumjacent structures and organs.

XVIII.—TREATMENT OF FRACTURES OF THE PATELLA.

BY DAVID C. PEYTON, M. D.

JEFFERSONVILLE, IND.

Fracture of the patella, while constituting only about 1 to 2 per cent. of all fractures demands the most careful considera-on account of its close proximity to the knee joint, and also in consequence of the very imperfect and unsatisfactory union of the fragments by the ordinary mode of treatment. The relative infrequency of the fracture of this bone is probably in part due to its small size and compact formation, as well as its convex anterior surface and the readiness with which it may be moved about in its position. It occurs more frequently in the male than in the female, the ratio being about five or six to one and more frequently between the ages of 25 and 55. The very old and the very young are

almost exempt from this fracture, but when occurring in extreme old age, statistics show it almost always to be in the female, the youngest case probably on record being five years old, reported by Hamilton in his 127 cases. Dittmer reports one case in a boy nine years old.

The two potent factors in the etiology are muscular action and direct violence. I am convinced that the sudden and violent contraction of the quadriceps extensor is the cause of a large majority of these fractures, and that only a relatively small per cent are the result of direct violence. It is true that more than 60 per cent. of these fractures are of the transverse variety, and it is equally true that the transverse are always the result of violence and sudden contraction of the quadriceps, while the vertical, stellate, comminuted and compound are probably due to direct violence of one kind or another. The fracture by muscular action probably occurs when the knee is in a position of semi-flexion, for in this position the middle portion only of the under surface of the patella is resting on the anterior surface of the condyle. The action of the quadriceps at this time being almost at a right angle to the surface of the patella, in case of a sudden and severe contraction serves as a most efficient agent in causation. It is probable that a small per cent. are due to combined effect of the muscular action and direct violence. It is difficult to correctly estimate the relative importance of the various known causes, for the reason that the statements made by the patients at the time of or after the injury are untrustworthy and misleading. The patient stumbles and falls after an effort to catch himself, and an examination discloses a fracture of the patella. The patient, as a rule, is unable to give an intelligent account of the fall, and especially the point of contact, and he concludes he must have fallen upon the knee cap, and no doubt this conclusion was reached by his knowledge of the fact that the patella was fractured. However, if we but bear in mind the very important part played by this muscle, that it is the great extensor of the leg, being united below in a single tendon attached to the patella, and that the entire anterior aspect of the femur is covered by it from the tro-

chanters to the condyles, we can readily understand the important part played by it in the cause.

The displacement of the fragments depends largely upon the character of fracture, for those resulting from direct violence, such as the vertical, comminuted, and some oblique rarely show much displacement, for in this class of fractures we have rather extensive contusion of the soft parts, while only the minimum laceration obtains. It is in the transverse fracture that we have the most pronounced separation and general displacement of the fragments. It is in this class we have the extensive laceration of the aponeurotic and fibrous coverings of the bone, as well as laceration of the synovial membrane of the joint and rupture of the prepatellar bursa. The joint soon fills with blood and exudate, which serves to further separate the fragments, and a little later the gradual retraction of the ligamentum patellae increases the separation. The fractured surface of the proximal fragment is often drawn in toward the cavity of the knee joint, due to the action of the vasti fibers inserted into its sides. Other displacements, as the lateral and angular, are recognized later on. As a result of the increased stretching of the fibrous union we may have a lateral angular displacement. Anterior angular displacement sometimes occurs as a result of cicatrical retraction of the lateral soft parts. The associated injuries to the soft parts almost invariably result in opening the knee joint, the lateral expansions and capsule being usually involved.

The diagnosis of fracture of the patella is comparatively easy, and only in rare instances do we meet conditions rendering a diagnosis uncertain and difficult. Sometimes we do not reach the case until a considerable length of time after the injury, when we may find the joint greatly distended, and at the same time so little displacement of the fragments that a positive diagnosis is not to be thought of. The absence of crepitus also adds to the uncertainty, and, notwithstanding the statements by some of our most eminent writers to the contrary, in my own experience, and in the experience of others with whom I have discussed the question, crepitus is seldom a symptom, for the very good reason that in almost ev-

ery instance the aponeurotic covering, if not actually torn, is stretched so as to admit of separation of the fragments, the covering dropping between the fragments, and this, together with the hemorrhage which always occurs, is quite sufficient to prevent crepitus. Usually, however, the fracture is readily recognized by sight and touch; the division of the bone, with more or less separation of the fragments, with individual mobility, renders the nature of the injury unmistakable. The degree of loss of motion is dependent largely upon the extent of laceration of the lateral expansions. The distention of the joint comes on rapidly, the result of blood and serum effused into the cavity, and extensive ecchymosis of the surrounding tissues follows quickly.

The question of the expediency of treatment by open arthrotomy or the non-operative procedure is as yet, in the minds of some, not settled, and as one of the enthusiastic advocates of the treatment by the open arthrotomy, I am ready to admit that in some cases this plan is not advisable and the non-operative treatment is to be employed. Of course in patients over 50 years of age and in those whom the physical condition is below the standard, I would not resort to the open method. Neither would I recommend the open arthrotomy where it is not possible to get the patient into a well-equipped hospital or where the operation is to be done by other than a surgeon whose technique is absolutely perfect, for with the foregoing contraindications the dangers of sepsis, ankylosis, loss of limb, or possibly loss of life, are greatly to be feared. But with a healthy patient under 50 years of age and a surgeon who will conscientiously carry out the slightest detail needed to secure perfect ascepticity, and who is imbued with the true spirit of asceptic surgery, the patient will have a good joint by reason of perfect bony union, and in a much shorter space of time. The first indication of treatment in every case is to immobilize the joint by suitable posterior splint, elevate the foot and apply the ice bag for three or four days to check effusion and limit inflammation, when a close-fitting roller bandage will be found of service. There have been a great many kinds of dressings suggested

and tried, many of them having only historic interest, all having some points of virtue, but in most instances falling short of the prime object of treatment, perfect apposition of the fragments. This I do not consider possible in the non-operative method, and the dressing that offers the nearest approach is the one to be employed. Personally I prefer securing the fragments in the best possible apposition and applying a shield of adhesive plaster above and below the knee in such a way as to maintain apposition of the fragments. Hamilton's method of a wooden incline plane is also good as a non-operative procedure. In treatment by the non-operative method the union is always necessarily fibrous, on account of the interposing of fibrous tissue between the fragments. Hamilton's method of a wooden incline plane is also will secure bony union, unless this is removed. Later we have stretching of the fibrous union, greatly reducing the usefulness of the joint. Open arthrotomy should not be done for eight or ten days following receipt of injury, as inflammatory action usually follows, so that the danger of infection is greatly increased by immediate operation. After application of the ice bag and compress for some days, the plan I follow is to open the joint by transverse incision from condyle to condyle, exposing the fragments and removing all clots, freely irrigating the cavity with normal saline solution and suturing the edges of the torn aponeurotic covering with chromicized catgut. This brings the fragments into perfect apposition. The superficial incision is then closed with silk-worm gut, without drainage, and the joint immobilized by a posterior splint, with either the plaster of Paris or crinolin dressing (I prefer the latter on account of its lightness.). This dressing is left on for about four weeks, when it is removed and passive motion begun. At the end of six weeks all restraint is withdrawn, and the patient advised to walk and actively move the joint. It is not good policy, however, for the surgeon to resort too early to severe efforts to flex the joint beyond certain limits, for in so doing he is liable to destroy the union and re-separate the fragments.

It was my privilege a few months since to witness a case

with Dr. Bullitt, of Louisville, in a woman with transverse fracture of both patellae. The patient had been standing on the pavement during the icy weather of last winter, when, without warning, first one and then the other patella snapped, due undoubtedly to the action of the quadriceps in the effort to maintain an erect posture. Dr. Bullitt operated in about ten days after the accident, employing the open method, and closing the torn fibrous coverings with chromicized catgut, using no wire to hold the fragments, doing as pretty an operation as it has been my pleasure to see, with the most satisfactory results.

In my own cases where I have resorted to the open method the results have been most satisfactory. Only a few months ago a man 48 years old had a transverse fracture of the patella, and I employed the open method, getting a perfect joint.

My friend Dr. Rodman, of Philadelphia, is a strong advocate of the treatment by open arthrotomy and has operated on some three or four cases in the past year by wiring, and with good results. I do not think, however, the insertion of wire through the bony substance necessary to hold the fragments in apposition, but on the contrary, the amount of handling and bruising of the parts which this method entails makes it inadvisable. Of course in old cases of fracture, with much disability from non-union, wiring is probably best. After all, the prime indications in the operation are to remove the fibrous material interposed between the fragments and to clear the joint of blood clots and to perfectly appose the fragments.

In all cases of compound fracture the operation should be done immediately.

To summarize, by the non-operative procedure we always obtain a fibrous union. This union, which at first may leave the fragments only half an inch apart, in a few months may not only stretch so as to allow a separation of three or four inches, but may also stretch unevenly, rendering the joint almost useless. The patient is confined in dressing for months, with a much longer period of disability, and in the

end has a very imperfect joint. This, in case he is a laboring man with a family to support, is a very serious matter.

The treatment by open arthrotomy always gives a bony union, and at the end of four weeks the patient is out of dressing, and in six weeks should be walking, and in a short time is able to resume his work, and this, too, with a good joint.

DISCUSSION.

DR. EDWIN WALKER, Evansville, Ind.—I have been very much interested in the reading of this essay. I believe papers of this character will emphasize the necessity of dealing with fractures radically. Formerly, before the days of antiseptic surgery, we dreaded to communicate with bones on account of fear of infection. Now that danger is practically passed and we should see that there is good apposition in all cases of fracture. I have not treated cases of fracture of the patella in this way because I have had no cases, but I have treated cases of fracture near the shoulder joint in the same manner, where I was unable to replace the bones. On examination I found it was impossible to replace the fragments, and, after opening the fracture, it took a great deal of force and manipulation to bring the pieces together. I had a most happy result in this case and I feel sure that had I not done that there would have been permanent deformity. There are no more troublesome cases than fracture of the patella and this treatment is quite in advance. There is only one difference I would suggest in the technic of the operation. I wouldn't wash out the joint; that, I think, is entirely superfluous. When you use water, or anything of that kind, you are liable to carry infection. You will find that the dryer you do surgery the better will be your results.

DR. J. RILUS EASTMAN, Indianapolis, Ind.—In regard to flushing the joint with normal salt solution I would subscribe to Dr. Peyton's opinion rather than to that of Dr. Walker. I believe infection is much less likely to occur if we use the salt solution than if we operate dryly. The experiments of Waltharel, which are elaborate, show, as far as experiments can show, that the peritoneum and other serous membranes, when kept perfectly dry, are more readily susceptible to infection than when moist. The heat of the solution is also efficient in preventing infection. Waltharel showed that in animals, if the peritoneum were inoculated with staphylococci, infection did not follow if moist heat was applied to

the peritoneal cavity. Turck also found that the lowering of the temperature causes a loss of resisting power of the peritoneum to the attack of micro-organisms.

DR. FRANK D. SMYTHE, Memphis, Tenn.—I have been very much entertained by the paper and wish to commend the points brought out in this admirable essay, and I want myself on record as being an advocate of the open operation in all cases where the patient can be treated by an experienced surgeon with suitable environments. In the hands of inexperienced men my opinion is that they had better be treated by the non-operative method. In hospital work, where we have every facility for carrying out asepsis in detail, there is no increased risk in operating, while such operation by a man careless in technic will, in all probability, result in a serious deformity, if not in amputation of the limb. I operate under a stream of normal salt solution in joint work.

The time of operation is a most important and practical point, and I hardly agree with the essayist in this, that is to say, the operation should not be performed at once after the examination of the patient for the reason that an extensive contusion exists, hemorrhage and laceration of the fibrous tissue about the joint, rendering the tissue liable to infection and the setting up of an inflammation which would interfere with the chances for recovery. The practice I have pursued has been that of surgeons in general; that is, drilling through and uniting the bone with chromicized catgut. I no longer think this is necessary since hearing the paper, and in my next case I shall confine the operation to suturing the aponeurosis and leave the bone undisturbed. If we can get union without going through the patella, I feel that it is unnecessary to further traumatize the joint.

DR. CHAS. E. BARNETT, Ft. Wayne, Ind.—Fractures of the patella are somewhat overestimated. The pathology of the bone is at fault. The patella, considered as a mere sesamoid bone, should not fracture easily. I have had only one fracture of the patella in twelve years. It was from muscular action alone. A plaster cast with extension gave a perfect result. However, I agree with the essayist that the proper operation is to go into the synovial sheath and unite the patella. There is no more danger in going into a joint cavity than into any other cavity. I think the best plan is to unite the patella with wire or nails. I don't believe in uniting the capsule and leaving the bone alone, because the bone is first at fault; it breaks from having too much of the lime salts and the bone will not unite well on account of its pathology.

I agree with Dr. Walker in regard to dry surgery. Just as far as possible we ought to treat in this way; it is a good deal bettter than wet surgery.

Dr. H. E. Pearse, Kansas City, Mo.: The remark of the last speaker as to the danger of entering the joint cavity brings to mind the fact that the danger of entering a joint cavity, like the danger of entering the peritoneal cavity, exists in the danger of leaving adhesions behind. The stiff joints that I have found after patellar fracture are where the patella is held with something near a good result, but there are adhesions behind in the joint. When we think of the anatomy of the ankle joint we have the bones of the foot and the lower leg acting as a fulcrum. At the hip we have the same condition with the femur acting as a pendulum and the knee as the fulcrum. In the knee we have no such condition. The patient exerting a tremendous power through lifting or pulling, we have the patellar ligament thrown to the outer side of the circle and bearing the leverage, consequently the knee joint is given a much larger surface than any other joint in the body for nourishment, and when the patella snaps the damage to the patella is remediable; the real danger is down the sides of these joints. Dr. Wyeth has said that the best thing to do is to let them alone and treat with a plaster cast, and yet in the light of the few cases operated on we have found such an amount of hemorrhage inside the joints and such destruction of articular surfaces and lateral ligaments of the joint, fracture of the capsule clear down on the sides, that it would seem wise to interfere. As to the method of fastening the patella, we should put the fragments together and use common sense. It may be necessary to drill one hole or two, but more frequently we can surround the patella and gain points of fixation for the sutures in the ligamentous tissue above and below, working but one-fourth of an inch down when the patella is fixed, as a careful closure of the joint capsule will determine whether the patient will have a good joint or a bad one. It is my practice to keep the leg immobilized with either complete or partial extension for the first two months—I restrain motion for eight months.

Dr. A. Herring, Highland Station, Kas.: As a country practitioner I want to say we don't do all these operations—we don't think they are necessary. I have only treated a few cases. One was a lady past fifty years of age, weighing 250 pounds, and I used what common sense I had with

a plaster of Paris dressing. I have never tried these operations and would not feel competent to undertake them, but I don't think it is necessary to do too much operating.

DR. PEYTON, in closing: I have listened with a great deal of satisfaction to the liberal discussion and assure you I appreciate it very much.

In regard to Dr. Walker's remarks as to the dry method of operating, we must not forget that we have to contend with the blood clots in this joint. One of the objects of the operation is to get rid of these clots and you have to do it either by flushing or going in with your hands and removing them, and we all know the value of keeping our hands out of wounds, and washing with normal saline solution.

In regard to delaying the operation I cannot see where we lose anything by a delay of six to ten days and we certainly gain a great deal, for in so doing we get rid of the acute condition before operating.

In reference to Dr. Pearse's remarks, I don't believe in, and it has not been my practice to surround the patella with any ligature or anything to hold the fragments in apposition, for it has been my experience that by suturing the covering this covering is entirely strong enough to withstand any indirect movement and the fragments will be held in apposition. Again, this idea of restraining movement in the joint for eight months would most certainly result in adhesions and give an imperfect joint.

XIX.—ANTISTREPTOCOCCIC SERUM IN SEPTIC CONDITIONS.

BY C. E. RUTH, M. D.

KEOKUK, IOWA.

Believing that experience may be of more value than any amount of theory, I herewith present results of experience in the use of antistreptococcic serum.

Case 1.—January, 1901, operated upon Miss E. B., aged twenty-three years, for relief of abscess in the abdomen. As free drainage as possible was made, but owing to the mixed nature of the infection, chills, fever, rapid pulse and anorexia, grew worse and dissolution was imminent. Ten c. c. of serum were injected and several times repeated as occasion required, resulting each time in prompt reduction

of the temperature with corresponding improvement in the pulse, appetite, and general well being. The patient finally succumbed to tuberculosis. It was unreasonable to expect so thoroughly mixed an infection as existed in this case to be cured by the serum. Strepto- and staphylococcic infection was found to exist with the tuberculosis. So marked was the amelioration in this patient's condition from the use of the serum that I could not question its neutralizing influence on at least a part of the toxins.

Case 2.—Mrs. P. K., June 19, 1901, operated upon for appendicitis and pyosalpinx. Within forty-eight hours the temperature was 104 degrees F., pulse 140 and very weak. Death was apparently to be confidently expected within a few hours. Ten c. c. of serum were injected with a fall of temperature of two degrees in four hours. Ten c. c. were again injected with the result that the temperature became normal in six hours and remained below 100 degreees F. In thirty-six hours the pulse fell to less than 100 degrees F., and was of good volume. Convalescence was thereafter uninterrupted.

Case 3.—Mr. Fenton, January 18, 1902, operated upon for appendicitis. Appendix was found sloughed in pus sac, and, with adherent omentum, was removed. In twenty hours, the pulse reached 160 and could not be taken at the wrist. Temperature 104 3-5 degrees F. Ten c. c. P. D. & Co.'s antistreptococcic serum were injected. No fresh serum being at hand, serum three months over age was used. Pulse was promptly reduced to 120, and temperature to 102 degrees F. Pulse and temperature began to rise again and ten c. c. of serum were injected. In five and one-half hours temperature was normal and remained so. Pulse regained strength and lessened in frequency more slowly, but improvement was steady. In this case, there was every indication of prompt dissolution, including cyanosis of the already ghastly, death-like face. Drainage in this case was maintained for two weeks.

Case 4.—Mrs. May B., February 28, 1902, vaginal hysterectomy for retro-flexion and myo-fibroma of the uterus. Though there existed a slight rise of temperature and pulse, no anxiety was felt regarding her case till the fourth day, when obstruction of the bowels came on with general peritonitis. Death occurred in eleven days from date of operation, the last three days showing every indication of a severe septicemia. One hundred c. c. of serum were used in

ten and twenty c. c. doses without pronounced benefit. Bacteriological examination showed a pure streptococcic infection; but, before the condition was recognized, the peritonitis was so extensive, and the toxemia so profound, together with resulting obstruction, that failure was to be expected. Post-morten showed peritonitis extending to diaphragm with large muco-purulent accumulation free in Douglas's cul-de-sac.

Control experiment. March, 1902, injected a guinea pig with urine containing mixed strepto- and staphylococcic filtrate. Pig had severe chill and was very sick within six hours. One antistreptococcic injection of serum, P. D. & Co.'s was made, with prompt return to the normal. Pig remains well after six months.

Case 5.—A. F., aged 23 years, March 26, 1902, operated upon for floating kidney. Operation was without incident save for great venous vascularity of the muscular tissues of the back. Within twenty hours, rise of temperature, quickening of pulse, and facial expression betokened profound toxemia. Antistreptoccic serum was used freely but without avail and death took place in five days. Post-mortem revealed staphylococcic infection in and about the wound. Owing to the fact that the infection was staphylococcic, we were not surprised that the antistreptococcic serum was inadequate.

Case 6.—Mrs. F. M. F. was confined February 5th, 1902. Labor was severe. Forceps delivery with perineal laceration to rectum. Perineum was immediately repaired. Union was procured through about one-half the extent of the tear. Recovery was tedious. Catheterization was done for two weeks under chloroform. Ten days after labor, erysipelas started in the vulva and rapidly spread over the perineum and almost the entire buttocks to the iliac crest. Temperature and pulse, for her enfeebled condition, ran sufficiently high to cause alarm. 120 c. c. of serum were injected in doses of ten c. c., with pronounced amelioration of the symptoms following each injection. Temperature was always reduced one or two degrees, while the pulse lessened in frequency and increased in force. In this case, the serum was relied on almost to the exclusion of all other treatment.

This patient at her best is a very frail, delicate woman. In any case, erysipelas in the parturient must be considered grave. That the serum was a material aid, if it did not save her life, I have no doubt.

Case 7.—Reported by Dr. C. F. Mehler of New London, Iowa. Mrs. Mc., age 69 years, convalescent from a very severe attack of broncho-pneumonia. Was attacked April 22, 1902, with a severe chill and vomiting. Saw her April 23, 7 a. m. Temperature 104½ degrees F., pulse 90. Erysipelas had started at ala of nose and had spread over nose and forehead. Vomiting constantly. Could not retain anything on stomach. Applied ichthyol locally. At 8 p. m., temperature 105 degrees F., pulse 90, and still vomiting. Suggested the use of antistreptococcic serum on the favorable report of Dr. C. E. Ruth, but was refused. April 24, 7 a. m., temperature 104½ degrees F., pulse., 92, and still vomiting. Gave nutrient enema, as the stomach would not retain anything. At 7 p. m., temperature 105 degrees F., pulse 90, and still vomiting. Erysipelas had spread all over face, head, ear, and partly down neck. Administered ten c. c. of antistreptococcic serum, P. D. & Co.'s. April 25, 7 a. m., temperature 102 degrees F., pulse 90, no spread of erysipelas. At 8 p. m., temperature 102½ degrees F., pulse 91, no spread of erythema, nutrient enema continued. Gave ten c. c. of serum. April 26, 6 a. m., temperature 99 3-5 dedrees F., pulse 90, no vomiting. Took some nourishment and stimulants, which were retained. Continued enemas. At 8 p. m., temperature 98 3-5 degrees F., pulse 88, erysipelas fading and no extension. Took nourishment freely. From this time on she made a steady improvement and good recovery.

Case 8.—Mrs. T., reported by Dr. C. F. Mehler, aged 40, was attacked with erysipelas April 28, 1902. Saw her April 30, at 8 a. m. Erysipelas extended over face, head and neck nearly to sternum. Temperature 104 degrees F., pulse 110. Applied ichthyol. Gave her ferri chloridum and quininam internally. At 10 p. m. temperature 105½ degrees F., pulse 128, vomiting some. Gave ten c. c. P. D. & Co.'s serum. May 1, 8 a. m. temperature 101 2-5 degrees F., pulse 110. Repeated serum. At 10 p. m., temperature 99 degrees F., pulse 100. No spreading, stomach quiet. May 2, 9 a. m., temperature 98 3-5 degrees F., pulse 90. Erysipelas fading. Patient takes nourishment freely and from this time improved steadily and made a perfect recovery.

Case 9.—Reported by Dr. Mehler. Mrs. S., aged 76 years, was attacked with erysipelas May 21, 1902. Saw her May 23, 5 p. m., temperature 106 degrees F., and pulse 110.

Erysipelas extended over face, head, and neck. Vomiting. Applied ichthyol and gave ten c. c. P. D. & Co.'s serum. May 24, 10 a. m., temperature 101 degrees F., pulse 98. Taking a little nourishment. Gave ten c. c. of serum. May 25, 10 a. m., temperature 100 3-5 degrees F., pulse 96, no vomiting or spreading. Took nourishment and tincturam ferri chloridi and strychninam. Gave ten c. c. of serum. May 26, 10 a. m., temperature 99 degrees F., pulse 95. Takes nourishment freely. Redness and swelling disappearing. May 27, 10 a. m., temperature 98 3-5 degrees F., pulse 90. Takes nourishment well. May 30, 5 p. m., temperature 98 3-5 degrees F., pulse 90. Made a good recovery.

Case 10.—Reported by Dr. W. G. Doern, Fort Madison, Iowa, Mr. Fred P., American, aged 33 years. Evening of September 30 patient taken with severe chill with pronounced swelling and burning of the nose. October 1, 4 p. m., found entire nose bright red and greatly swollen. Prescribed tincturae ferri chloridi gtt. xv. every two hours. October 1, 9 p. m., inflammation had extended three-fourths of an inch, temperature 103 degrees F., and pulse 120. Injected ten c. c. P. D. & Co.'s serum. October 2, 9 a. m., general symptoms subsided. Temperature 99 degrees F., pulse 100. Slight extension but inflammation more diffused, the distinct border-line being absent. Injected ten c. c. of serum. October 2, 9 p. m., patient feeling well, temperature 99 degrees F., and pulse 98. Redness extended slightly higher on forehead but gradually shaded off to normal skin. Slight swelling and burning. October 3, 9 a. m., no change. Injected ten c. c. of serum. I made no local application that I might see exactly what the serum would do. The course after the third day was uneventful.

Case 11.—Fred Shaw, May, 1902. First seen by me in consultation with Dr. Tobin about a week after receiving barbed wire injury to right thumb. Profound septicemia had rapidly followed the injury, resulting in a diffuse cellulitis which spread up the forearm and arm, then over right side and back, involving the cellular, connective and muscular tissue to great depth both in the axilla and right lumbar region. Gave ten c. c. of serum May 12, 1902, which was repeated daily for five days by Dr. Tobin. Improvement was thought to be satisfactory for a couple of weeks, when pus began to be discharged from the urine and this was preceded and followed by severe pain with rapid prostration. He was brought to St. Joseph's Hospital and operated on by me June

8, 1902. Right kidney was opened and drained from the pelvis. All pus cavities were thoroughly opened and supportive treatment carried out with ultimate complete recovery.

Case 12.—Mrs. George H., referred by Dr. A. J. Nossaman. Operated on September 4, 1902, for suppurating ovarian cyst of large size. Cyst had been twice tapped by Dr. Nossaman in the three preceding weeks. From leakage and rupture of the cyst, peritonitis with very extensive adhesions existed. Cyst wall was so rotten that it would not bear its own weight and in spite of all care many points of rupture were produced in separating adhesions and lifting out the sac. Cyst contents were distributed generally through the cavity. Abdomen was thoroughly irrigated with hot saline solution and wound closed over all the water the abdomen would hold. The entire posterior surface of the omentum was adherent to the tumor. This extensive infected surface bled persistently. To control the oozing the entire omentum was rolled into a close mass and sutured in position. Patient was very feeble and rallied slowly. Pulse began to quicken and lessen in force until, at 5:45 p. m., September 5, pulse was 140 and temperature 101 degrees F. Gave ten c. c. of serum. Ten p. m., temperature 102 degrees F., pulse 150. Injected ten c. c. of serum. September 6, 2 a. m., temperature 99 degrees F., pulse 124. I injected ten c. c. of serum. At 3 p. m., temperature 100 degrees F., pulse 132. Gave ten c. c. of serum. At 7:30 p. m., temperature 100 2-5 degrees, pulse 136. Gave ten c. c. of serum. September 7, 2 a. m., temperature 99 2-5 degrees F., pulse 120. At 2 p. m., temperature 100 degrees F., pulse 108. September 8, 1902, temperature average 99½ degrees F., pulse 100. September 9, temperature 98½ degrees F., pulse 96. Progress in this case has since been devoid of incident and complete recovery is assured. Judging from my past experience with septic conditions of great severity, I am certain that cases two, three, six and eleven would have been lost without the use of the serum.

"The streptococcus of erysipelas resembles very closely the streptococcus pyogenes of Rosenbach, in fact cannot be distinguished from it microscopically, while the cultures of the two organisms resemble each other very closely."—Tyson.

"There are plenty of cases on record in which good results are obtained by its use. A few facts are quite certain—It is useful only in cases of undoubted streptococcic infection. Before using the serum an accurate bacteriological examination should be made. Also there appear to be varieties among

the streptococci, the infection of some of which will be influenced by a peculiar kind of streptococcic serum, but all streptococcic infections will not be improved by the serum treatment." The absurdity of waiting for a bacteriological identification of the streptococcic infection appears in the same work, on the next page of the same article, in which the following statement is made: "The serum can do no harm and if it does no other good it acts as an excellent food."

***A. W. Harrison describes a case of facial erysipelas of unusual severity. The temperature had reached 105 degrees F., and the patient was thought to be moribund. He injected twenty c. c. anti-streptococcic serum and improvement began at once. Injections of ten c. c. were repeated twice daily at first, subsequently once per day. The patient made a rapid and complete recovery.

*"Marmoreck claims that all pathogenic streptococci are identical. He bases this claim on the three common characteristics that he has found present in all the bacteria taken from forty-two diseases. These peculiarities were: The production in vivo of hemolysis in rabbit's blood, the inability to grow upon a filtrate of their own cultures, and the immunization of animals by Marmoreck's antistreptococcic serum. The immense amount of labor in trying to separate different species of streptococci is, therefore, wasted, and clinicians will be compelled to find some other excuse why the antistreptococcic serum does not cure. But it must be remembered that the virulence of the micro-organism varies greatly."

In pure streptococcic infection, uncomplicated, however severe, improvement has been immediate and recovery has been complete even when the use of the serum was not begun until the patient was almost moribund.

The average individual seems to be able to take care of a very large and virulent dose of the streptococci provided their toxins are rendered innocuous. Two doses of the serum were sufficient in some of the most severe cases, while others required five or more. Ten c. c. produced no unpleasant symptoms whatever, while twenty c. c. sometimes produced severe itching, and one or more crops of uticaria. No attention was paid to the morphology of the streptococcic infection and though the

***Stevens American Year Book Medicine and Surgery 1902.

*Courier of Medicine for September 1902.

benefits obtained were prompt in all, the degree of benefit varied as I had expected. I considered this due to difference in virulence of the infection, vital resistance of the patient, and potency of the serum. My best results were obtained with the P. D. & Co.'s serum, even when considerably over age. I am convinced that the best results will be obtained by the early use of the serum and, thereby, severe complications will be sometimes avoided. Bacteriological examination should be made in all cases when possible, but the use of the serum should not be delayed until the examination is completed, for in many cases it would mean that the patient would be dead or beyond help. In no case of streptococcic infection, uncomplicated, can I record a failure of the serum even when apparently used in the last extremity.

In my single case of pure staphylococcic infection, though lost after persistent use of the serum, I am convinced that not only did the serum do no harm but that the first few doses reduced the temperature and improved the pulse. If it is of no other benefit, it is an excellent though very expensive food. The majority of the grave infections are of the streptococcic variety and therefore, in a measure, amenable to serum therapy.

In a mixed infection of strepto-staphylococci, the serum, properly used, will neutralize the toxins of the streptococci; and the *vis medicatrix naturae* will usually take care of the staphylococcic infection, if it has not already gained too extensive a lodgment and multiplication in the circulating medium. My experience with the serum in erysipelas has been a delightful surprise, converting the most grave and apparently hopeless cases in four to twelve hours into certain convalescence.

My experience with the serum has given such satisfactory results that cases which were formerly certainly lost, giving a mortality of 100 per cent., in the last eighteen months have given a mortality of but 40 per cent. Besides, the amelioration in other cases has been so great that I am convinced that it has a much wider field of usefulness than I had even suspicioned when I first began its employment in septic condi-

tions. Tavel reports forty-six cases of various infections treated with antistreptococcic serum. This list includes puerperal fever, erysipelas, pneumonia, appendicitis and four cases of staphylococcic infection. He attributes the recovery in many cases to the prompt use of the serum, which was eminently beneficial in some, but was absolutely ineffective in ohter cases of the same diseases. The serum was used with marked success in a case of recurring erysipelas, both as a curative agent and as a prophylactic.

In a metastatic infection following an angina with rheumatism, endocarditis and nephritis, no benefit followed other treatment, but improvement began immediately with the use of the serum, and the temperature reached normal after the third injection. Travel's experience indicates that the streptococcous serum has a favorable influence even on staphylococcic infections. The variability in the action of the serum of which he complains may be due in part to the varying source from which the serum was obtained and to its preparation for use. Tavel used new cultures without passage through animals, which Marmoreck considers indispensable, but which he (Tavel) considers not logical. While we are still unsettled as to the best source of obtaining and best methods of preparing and using the serum, we may expect a greater variability as to results than will be secured when it is positively determined where it shall be procured, and how it shall be made and used.

The results reported in the treatment of cerebro-spinal meningitis by the serum are truly wonderful, but here, as elsewhere, disappointment is occasionally experienced and this may be readily understood when we remember that the infection may be the diplococcus of pneumonia, staphylococcus or streptococcus, etc., one or all in the same case; but if only one case in ten were benefitted instead of one-half being immediately cured by the serum, our duty would be to use it in all cases like this which gives a primary mortality of 30 to 80 per cent. and leaves one-half the remainder worse than dead.

The recent investigations published by Singer in the

Wiener Klin. Woch in reference to rheumatic fever, considering it as a variety of pyemia, and reporting the finding of streptococcus pyogenes in cover glass preparations and having made cultures of the germs from various internal organs, together with the recognized relations of follicular tonsillitis to rheumatic fever, account at once for the remarkable benefits from using the serum in some cases of rheumatic fever.

Though all points with reference to the use of the serum are not settled, my experience with it warrants me in saying that in no case of severe sepsis would I consider that I had discharged my obligations of responsibility to the patient until I had used the antistreptococcic serum. It does not in any way interfere with any line of treatment that the surgeon may see fit to carry out.

The injections properly made are not more painful than an ordinary hypodermic and have never caused inflammation or any serious local or general disturbance. I have always made the injection deep in the gluteal region.

DISCUSSION.

DR. C. LESTER HALL, Kansas City, Mo.: This is the most elaborate report I have seen or heard in regard to the value of antistreptococcic serum, and the results and statistics the essayist presents are certainly very encouraging. I have been much interested in regard to the action of the serum—as to the manner of its action. I have always doubted that the diphtheritic antitoxin—or any of the toxins—act in a chemical or antidotal way. I have believed that they act by increasing the vital resistance and the essayist strengthens this theory by saying that if they do no harm they certainly act as a tonic. I think that in diphtheria it is not an antitoxin—it is the nuclein in the serum itself. It is a peculiar thing that these serums are selected from animals which are refractory to the disease—diphtheria antitoxin from the horse and antitetanic serum from the dog, both of which animals are antagonistic to these diseases. I was much pleased with the doctor's idea that the patient is usually beyond all hope if we wait until a bacteriological examination is made before using the remedy. It is a dangerous thing to wait, and whether the percentage of cures is increased or not in the future, I believe we are all prepared to use the remedy after hearing Dr. Ruth's paper. With the marvelous improvements of today

over old methods, we are justified in using antistreptococcic serum. The value of this paper to the general practitioner as well as to the surgeon is incalculable. Like the X-rays, it is another advance in therapy—another step in advance of the old remedies and old methods.

DR. T. C. BOULWARE, Butler, Mo.: There is a kind of fad in the profession now to evolve a theory, and then try to make the facts correspond with the theory—ignoring facts already gained. This serum treatment is something that very few physicians have tried. The doctor's paper is, I presume, a good one on the subject, but I have never tried the treatment mentioned. I can, however, give you a brief account of my treatment and the percentage of results:

I was called out to see a case one night about fifteen or twenty years ago, and upon my arrival, found it a case of erysipelas. It was the practice in those days to use tincture of iodine as a local application for this disease. I found I had none of the tincture with me and concluded to make a salve composed of lard and sugar of lead. I called for a small quantity of lard, a saucer and a case knife. I then got out my sugar of lead bottle, which had all the appearance of being well filled, but which, as a matter of fact, I found to be empty. Having my back toward the occupants of the room, which prevented too close scrutiny of my methods, I shook the bottle with great care over the lard in the saucer and worked it up vigorously with the case knife as though incorporating a medicine with the lard. Then I gave directions how to use the "salve," etc.

Upon my arrival to again visit my patient the next morning, a good old lady who had applied the salve during the night was loud in her praises of the remedy. She declared it to be the best salve she had ever seen and stated that it gave immediate relief upon application. Well, I have used this same "salve" in many cases since and find it gives relief at once. My treatment of erysipelas generally may be stated briefly as follows: Move the bowels at the commencement with calomel, and if found necessary to move them afterwards, give a saline cathartic. Keep the affected parts well greased with lard. Give tinct. iron, 15 to 30 drops every four hours. Should blisters appear upon affected parts, puncture them and with a cloth press out the serum. If an abscess appears or forms upon the parts affected, I open it and treat as I would any other abscess.

With this treatment all my patients get well. I do not

know whether the serum treatment is better than that or not, but if it is better, the physician out on the cross-roads may not always have his serum with him and his patient might die while he was trying to get it.

The only logical conclusion one can arrive at is, when people are in need of the services of a physician and send for one, they desire and expect to be relieved of pain, and when possible, restored to health.

DR. GEO. W. CRILE, Cleveland, O.: I have tried the anti-streptococcic serum in a good many cases and I must confess to be in doubt as to its value. I sometimes think I have obtained good results and then when used again I thought not. I must say I do not know what to think.

DR. RUTH, in closing: I believe there is nothing further to be said on the subject. The matter is still on trial. I simply feel like reiterating what I have already said. In this variety of cases, where there is a severe septic infection following major operations, the results have been almost uniformly fatal. I learned early in my experience to consider a patient with a pulse of 100 to be in rather a serious condition; if the pulse went to 130 I was quite uneasy; if to 140 the patient would probably die, and if the pulse reached 150 I simply counted him as dead. In these very identical cases treated with the serum which I have reported today there was 60 per cent. of successes. Of course the report is not extensive but it is sufficient, taken with other experiences that I have had in less severe septic conditions and carefully noting the results, to cause me to feel that I would not be doing my whole duty in any case of severe infection if I did not use the serum, no matter whether it was a case of pure streptococcic, or pure staphylococcic, or a mixed infection.

XX.—CULTURE OF INFUSORIA, WITH PRESENTATION OF SPECIMENS.

BY H. G. GRAHAM, M. D.

CHICAGO, ILL.

1. Preserving identity of individual organism while growing it.

a. In running water.

b. In stagnant water.

To grow the organism in running water, it is placed between a cover-sllip and slide. The slide is placed upon the

stage of the microscope and the organism is kept under constant focus. By means of a capillary tube, a constant stream of water is made to flow between the cover-slip and slide. In this the organism develops, and each change is carefuuly noted.

Favorite forms for this method of study are a chain of streptococcus, a chain of bacilli, an encysted protozoon and a resting body.

To grow the organism in stagnant water, by means of a cover-slip it is transferred from the surface of an infusion to a slide or to another cover-slip. By mounting the organism in this way much inert material is avoided and a clear field obtained.

After the fluid has evaporated, the organism remains adherent to the glass surface. When an actively motile protozoon has been mounted, the individuals will have ranged themselves in clumps and may form one compact mass.

The cover-slip may be placed on a solid or in a fluid culture medium with the smeared surface down. The slide is placed in a fluid culture medium with the smeared surface either up or down. If the smeared surface is directed upwards, it is protected from deposit of foreign material by means of a glass plate.

It is preferable to have an abundance of light and even sunshine reach the organism.

With light, coloring matter in the growing organism is abundant; without light, coloring matter is usually absent.

New material replaces the old in the subtsratum after twenty-four hours. When the organism lies dormant, changes in the substratum are made at longer intervals.

The organism is removed from time to time for examination under the microscope.

An encysted protozoon may disappear from the field in twenty-four hours or less, while a resting body may undergo no perceptible change in months. Such a body may have to be cultivated for a year or more before any change can be observed.

Another method of growing these incubating forms is to

place them with a drop or two of culture medium between a cover-slip and slide and seal them in with shellac.

Eventually, sometimes after many months, a fissure may appear in the capsule and through the rent the young may be seen issuing from the resting body. They may number from one to many hundreds of individuals, and may vary in size within as wide a range. All the individuals, however, escaping from a single body are of uniform size.

Although under such environment, the individual making its escape from an incubating form does not increase in size, multiplication in number appears to be practically unlimited except by the conditions obtaining in the substratum.

This experiment proves such an organism to be an anaerobe for at least a portion of its life cycle.

The organism may be grown at room temperature, or at the temperature of the body.

Development of the organism may be modified by immersing the slide in water. Further modification may be obtained by simply fixing the cover-slip to the slide by means of shellac and placing just under water where there is a slight surface flow.

2. Isolation of organism.

a. By means of the Petri dish.

b. By feeding to laboratory animals

Isolation of a single species may be accomplished by means of the Petri dish, or better still, the organism is fed to an animal and after the death of the latter a pure culture is obtained from some organ or tissue.

3. Transfer of elementary form to fluid culture media.

Since on a solid culture medium the organism cannot undergo further development, a new environment is provided, from which atmospheric air is not excluded.

For this purpose, a culture tube is made from soft glass tubing. One end is drawn into a capillary tube four inches long, the lumen of which will admit a fine platinum wire. The larger end is sealed.

The tube is placed in a filtered solution of Mellin's Food, of sufficient quantity so that after the fractional sterilization

of the culture medium as advised by Brefeld, the tube shall remain immersed in the fluid.

During the sterilizing process the tube has filled and when the fluid on cooling has reached 100 degrees F., it is removed and its contents inoculated, the germ being conveyed from the growing colony by means of the platinum wire. It is placed in an incubator as free from dust as possible with the open end directed downwards.

For convenience, the tube may be bent upon itself.

4. When the organism has reached its maximum development under the conditions present in the culture tube, it is a second time transferred to a fluid culture medium more accessible to atmospheric air.

Transplanted to a sterilized infusion under a bell-jar, it will reach maturity. A control experiment will assist in identifying the organism.

Or it may be grown as in one and five.

5. This experiment depends upon the fact that the culture medium must have free access to atmospheric air if the protozoon is to reach maturity.

When air does not freely reach the growing organism, only elementary and abortive forms develop. This may be shown as follows:

From the surface of an infusion, by means of a cover-slip, protozoa are conveyed to a slide. A cover-slip is placed upon them and the slide supported over water. A bell-jar is inverted over the slide, and is partially submerged.

To prevent evaporation of the fluid in which the organisms live, the interior of the bell-jar is rinsed several times daily with water.

Nutrient material in the form of wheat flour is placed from time to time at the border of the cover-slip.

After some weeks or months the area beneath the cover-slip is found to be divided into two zones. The central and larger one contains no protozoon, but a mass of bacteria occupies the former site of an organism. The outer zone, which is a narrow strip lying between the inner zone and the border of the cover-slip, contains protozoa that are in point

of size almost matured, but they are not perfect organisms. They are not motile. They do not change their position.

They present a peculiar appearance. The formed elements are greatly in excess, and the hyaline protoplasm, that stretches between them, is so transparent as to be almost invisible, and is deficient in quantity. It possesses a singular but exceedingly active undulating motion that may be compared to the vibrating of a violin string or to a flapping of a sail in the wind.

Something like this may be seen in dying water organisms, but in delicacy of structure and in subtlety of movement, this phenomenon is not to be compared with that just described. A function of the contractile vacuole would suggest that it has to do with respiration.

This idea is further supported by the fact that the phenomenon is to be witnessed only where there is free access of atmospheric air.

If this assumption is correct, where this condition does not obtain the hyaline protoplasm has lost a function, it is useless to support life, and is therefore absent.

The inflammatory focus in a tissue in a diseased condition may be compared to the two zones seen beneath the coverslip in the moist chamber.

Instead of the bacteria of the moist chamber, there are in the central zone of the inflammatory area, bacteria, detritus from broken-down tissue, etc., while the protozoa of the outer zone in the moist chamber are the leucocytes of the corresponding zone in the inflammatory focus.

DEDUCTIONS.

Tentatively it may be stated that the culture of infusoria will show: That

The protozoa and the diatomaceae exist in the tissues of the body in a number of the infectious diseases and vary in size from forms that are all but invisible up to that of the giant cell. It seems probable that when they first make their appearance in hyaline protoplasm, the most elementary forms of infusoria are invisible.

From the blood stream they are eliminated for the most part in the urine, as bacteria and as pus corpuscles.

Forms that become too large to float in the blood current are arrested in the meshes of filtration tissue, notably the lymphatic glands, the liver, and the spleen, where they undergo a process of reduction to more elementary forms, sometimes resulting in the formation of abscess.

Within the nuclear bodies from which they are derived, the elementary forms of these organisms are all but invisible under a 1-12th-inch oil immersion objective, and they are surrounded by a capsule. After rupture of the capsule, aggregation is to some extent maintained while multiplication continues.

From certain nuclear bodies both in protozoa and in diatoms, are formed filaments. These nuclear bodies form a sphere or spheroid with the coils of the filament at the surface In the interior of the sphere is a hyaline substance in which may or may not be seen other developing forms of the organism. The coils of the filament run spirally round the sphere, while the ends are at either pole. Between the coils on the surface of the sphere is a hyaline substance.

On the breaking up of a large sphere, the filament is first seen as a long and exceedingly delicate spiral, but it soon approximates to a straight line. It now grows in length and in width and sooner or later fission occurs. This is always transverse to the long axis of the filament. The filament may show no trace of fission, or fission may be indicated by a constriction more or less marked, or a transverse septum may mark the line of cleavage.

Fission in the filament may occur before disintegration of the nuclear body or sphere, or it may first take place long after.

If it occur before and is complete, the filament is seen as an aggregation of cocci, if alternately complete and incomplete it is seen as a mass of diplococci, and if fission is incomplete throughout its entire length, the filament is seen as a streptococcus.

From a small nuclear body is derived a short spirillum or a short bacillus.

If before complete disintegration of the nuclear body fission is less frequent, the filament is seen as an aggregation of bacilli—zooglea.

After disintegration of the nuclear body, with fission incomplete and infrequent, the filament is seen as a chain of bacilli.

A filament may remain intact until it contains as many as 400 frustules (diatom). From each frustule are produced by fission many other frustules, so that the number of cocci, diplococci, streptococci, bacilli or frustules that may be produced from a single nuclear body is probably very great.

In infusoria, fission in elementary forms is frequent, while in the mature organism, fission is comparatively infrequent.

Cocci, bacilli and spirilla derived from protozoa develop flagella, those derived from diatoms do not. A filament derived from a diatom may, however, possess a slight motion.

The most active spirillum seen in infusions, and which when mature is a serpentine organism from thirty to ninety mikrons in length, does not develop flagella. Its truly remarkable movements may be described as serpentine.

Fed in large numbers to laboratory animals, protozoa and diatoms produce infection, with development of fever that may result in death. The various forms of the organism are to be found in the tissues post-mortem, and if injected beneath the skin of a healthy animal, may produce death in less than twenty-four hours.

In those acute diseases that are self-limited, three causes operate to terminate the infection: 1. The natural resistance of the host. 2. The accumulation in the substratum (tissues of the host) of the infecting organism's own biological products, including those resulting from its own disintegration. 3. The rounding out of that portion of the life cycle of the organism that may be passed in such an environment.

This last is probably the explanation of relapse.

The leucocytes found in the tissues in infectious diseases are partially developed infusoria, are the indirect infecting

agent, and, as foreign bodies, are often eliminated in the urine as pus corpuscles.

Muller's "Dust Corpuscles" are such bodies in a more elementary form. Exceedingly small and actively motile forms are protozoa.

The staphylococcus pyogenes albus is an elementary protozoon; the staphylococcus pyogenes aureus an elementary diatom.

The bacillus is a form that occurs in the life cycle of a number of infusoria.

The trichocysts of paramecium are concerned in the propagation of the species.

The staining property of an organism varies with environment and stage of development. The resting body, which is the spore form of the organism, stains with difficulty, but when once stained, it tenaciously holds its color.

The infusoria are not the ephemeral organisms they are sometimes supposed to be. While active elementary forms may multiply at an enormous rate, other, resting forms, even when immersed in water, pass through an incubation period that may extend over many months.

Such *resting forms* are most to be feared as the carriers of infection. They are found in great numbers on the site of disintegration of the parent body and in fluids where the latter has for some time been depositing its ova. On evaporation of the fluid in which they have been incubating, they float in the atmosphere.

Atmospheric air is therefore to be considered as a possible source of infection, through water, and uncooked food that has been steeped in a fluid that could serve as a culture medium for infusoria are to be regarded as the usual sources.

The manner of origin of the infectious diseases produced by these organisms is explained by the history of the propagation, development and dissemination of infusoria.

Barring instances of the transmission of infecting agents by direct contact with other carrying media, they are to be sought for in *air, food, drink.*

The most effective means of preventing the spread of these infectious diseases, then, would be: The

1. *a.* Free drainage of marshes, ponds and all stagnant bodies of water.

b. Care that no vessels of the household be permitted to stand unmolested from day to day whose contents may prove to be a culture medium for infusoria.

c. Avoidance of throwing contents of such vessels near human habitations, upon loose soil, that months after may be deeply stirred.

2. *a.* Cooking of food that has for some time been steeped in a fluid that may have proved a possible culture medium for infusoria.

b. Avoidance of using as a drinking-cup vessels that may for some time have contained a possible culture medium for infusoria, without first carefully cleansing all surface to which infusoria may cling.

3. Filtration of the water supply where distilled water cannot be obtained or where the water cannot be boiled.

The morphological unit in the life cycle of an organism, which immediately precedes the initial manifestation of disease, is the resting body.

Itself having long lain dormant, when finally life stirs within, it is with an energy, an activity, and show of resistance to adverse environment equaled by no other motile form of the organism.

But with the latter are set free upon the bursting of the capsule the ovules of the resting body and these are still more resistant to adverse conditions than are the motile forms.

In form, size, color and structure, they resemble the pus corpuscles seen in pathological urine.

At the time they make their escape from the resting body, they appear very much like the leucocytes seen in inflammatory areas.

By treating with chemicals, their appearance may be altogether changed.

Though usually whitish or translucent, they vary in color within a wide range. In old infusions they are often a light

or a dark brown, and older incubating forms may be a jet black.

By feeding them to laboratory animals, it may be shown that protozoa may remain actively motile in their passage through the alimentary tract and that they may burrow into the mucosa and there become encysted.

The resting body may therefore be deposited direct in the inflammatory area.

The appearance of hundreds of spirilla, or of bacilli, issuing from such a body through a rent in the capsule and making their escape in all directions, may be compared to the rays radiating from the center of a sunburst.

XXI.—THE SANATORIUM TREATMENT OF PULMONARY TUBERCULOSIS AND HOW IT MAY BE CARRIED ON AT HOME.

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It may be stated, as a fundamental proposition, that notwithstanding the claims made for tuberculin and the various antitubercle sera, we as yet possess no specific treatment for pulmonary tuberculosis. We can not destroy the bacilli in situ and therefore our combative measures must be restricted to such as will fortify tissue resistance and thus enable the organism to successfully withstand the inroads of the bacilli. This is the more surely accomplished the earlier the disease is recognized and appropriate management is instituted; for pathological observation and clinical experience prove incontestibly that in the early stage pulmonary tuberculosis is curable. Medical statistics are often misleading, but it is probably safe to say that of incipient cases treated at sanatoria and reported upon, 59 per cent. are cured, while 86 per cent. are greatly improved. (Stubbert.) Some authors report much higher percentages, but the figures just given are probably within bounds.

These results are obtained in properly conducted sanatoria, whereas outside of such institutions the percentage of cures

and improvements is considerably less. It is the excellent showing made by closed sanatoria in Europe especially, although Trudeau's at Saranac Lake, and the Loomis Sanatorium at Liberty, New York, must not be ignored, which has justly made this plan of management highly esteemed and is fostering the multiplication of similar institutions all over the world. It is overcoming the prejudice of the laity and firmly establishing the value of such treatment in the minds of enlightened medical practitioners.

What constitutes a properly conducted sanatorium for tuberculous patients and what are the methods there employed? To answer these queries minutely within the time allotted to this paper is impossible. Concisely stated, a sanatorium of the German pattern is an institution situated where the air is pure and the buildings have a southern exposure and are protected as well as may be from cold northerly winds, where everything architectural and otherwise is planned with a view to giving the patients the most pure air and sunshine possible, where they are compelled to live in accordance with the strictest hygienic requirements, where they are under the constant control of skilled physicians and nurses who regulate every act of the patients' lives, and where medical treatment is wholly subordinate to the hygienic management. In a word, such a sanatorium is a temporary home, where the environment and regimen are intelligently and conscientiously made to aid the invalid along natural lines in his struggle against his foe, pulmonary tuberculosis.

What are the methods of management employed in such a modern sanatorium? In the first place, they do not consist in the use of the X-ray or some specific medication, or of some highly vaunted remedy administered by inhalation or subcutaneous injection, as creosote, tuberculin, antitubercle serum, etc. If such things are employed at all, it is in properly selected cases and to meet definite indications. The fundamental principle on which the superstructure of management is reared, is the hygienic and symptomatic treatment of pulmonary tuberculosis, and whatever other measures are employed are as adjuncts to relieve symptoms that retard im-

provement, or to enhance the beneficial effect of the hygienic management.

This consists of four requirements: (1) Life in the open air. (2) The consumption of large amounts of food. (3) Hydrotherapy. (4) Strict routine in the daily life of the invalid under the direction of skilled physicians and attendants. Such, concisely stated, are the modern sanatorium methods which are achieving truly brilliant results in the treatment of pulmonary tuberculosis and which outside such institutions are understood and adequately carried out by but few of the medical profession. Indeed, I have been told by a medical man of Chicago, who has traveled much in the health resorts of the Southwest and has a personal acquaintance with many practitioners in New Mexico and Arizona, that with but few exceptions the practitioners in such climatic resorts have a lamentable ignorance of the details of modern sanatorium management. As regards the majority of the medical profession, whom I encounter in consultation practice, I am forced to the conclusion they do not possess even a rudimentary notion of the principles underlying this mode of management. They still content themselves with vague general directions concerning the taking of fresh air and food; they dose their patients with cough mixtures and tonics, and reiterate their inquiry for some new and special line of medication. When the modern sanatorium methods are explained to them they often appear apathetic, and but few make a serious attempt to carry them out. It sometimes seems to me that the average doctor thinks his whole duty is performed when he writes a prescription or supplies his patient with a few tablets, whereas such is the least of his duties. Any one can dope a patient with drugs, but higher qualities are required of him who would properly instruct the tuberculous patient and his attendants how to carry out the measures which the experience of phthisiotherapists has proved to be of the greatest utility in the treatment of this ubiquitous disease.

Tuberculosis is a filth disease and nothing tends more surely to its development and progress than the impurities which

collect in the atmosphere of overcrowded or ill-ventilated buildings, and which, by Ransome, is fitly designated "air sewage."

On the other hand, fresh air and sunlight are inimical to the germ and are the surest means of enabling its victim to combat it successfully. Consequently the inmates of a modern sanatorium are required to pass as many hours a day as possible in the open air, while even at night plenty of fresh air is admitted to their sleeping rooms. They may be said on the average to spend from seven to ten hours a day out of doors, the more robust remaining out even in the evening. In most establishments inclement weather is not permitted to keep patients indoors, and at Falkenstein they have been known to carry out this part of the treatment when the thermometer registered as low as 13 degrees above zero.

To accomplish this open air treatment, verandas are provided with movable screens or curtains, or there are properly constructed shelters, the aim being to furnish the invalids with protection against the elements, yet without confining them within four walls. Thus protected against chilling winds patients rest for hours together on couches or reclining chairs, being supplied with blankets and hot bottles to keep them from becoming chilled. this last condition being absolutely essential to successful management. To guard against ennui they are permitted to converse, read, write or entertain themselves in other ways considered not fatiguing or exciting, for they are expected to have mental as well as physical rest in the open air.

In olden times, consumptives were told to exercise in the open air. Nowadays they are told to rest or exercise according to definite indications. Patients who are febrile, dyspeptic or losing weight are required to remain at physical and mental repose in the manner described, while only when such symptoms are no longer present are they allowed to exercise. Even then the effect of exercise is closely watched, and the amount carefully prescribed. Slow walking is the form of exercise permitted, and this only when the maximum body temperature has been found by frequent records not to

exceed 99 degrees F. At first, a walk of but a few yards is allowed, and if this does not raise the temperature a degree or more, its length may be cautiously increased until, when sufficient vigor of muscle and heart has been reached, convalescents are encouraged to walk slowly up easy inclines laid out for the purpose. Even then, patients are instructed not to persist in their walk if it causes undue fatigue or acceleration of the pulse and respiration.

Patients with high continuous fever are kept at absolute rest in bed, either in their rooms, the windows of which are wide open, or on the porch, to which their beds have been rolled. Nothing is so important to the success of open air treatment as due attention to the indications for rest or exercise in the manner thus briefly outlined.

The next matter of importance is the diet of the tuberculous patient. To meet the requirements of his wasting malady it must be rich in proteids and fats, while at the same time possessing sufficient carbohydrates to prevent an injurious preponderance of nitrogenous elements. It should, therefore, be a mixed dietary, and also be so varied and well prepared as to appeal to the delicate and fastidious appetite of the tuberculous. Inasmuch as such invalids are often unable to eat heartily, their nourishment must be taken at frequent intervals; not a bite or two every hour, but three principal meals, with intermediate luncheons, so that food of a suitable kind is taken six times a day. Moreover, febrile patients are not to be fed with the same dietary as are dyspeptics or those without fever. Neither must they be fed the same as those having hearty appetites and good digestion, a fortunate condition now and then encountered.

The kind of nourishment indicated is best furnished in milk and cream, eggs and meats, and yet good bread, cereals and fresh vegetables are permissible. So, also, are fresh fruits, if these latter are not partaken of so freely as to replace more substantial and necessary articles. It is manifestly impossible to enter into a detailed menu at this time, and hence I will only suggest that a cupful of warm milk, with, if thought best, a teaspoonful or two of rum or other stimulant, is a

capital thing for this class of invalids shortly after waking in the early morning. Milk may also be taken between meals when it agrees at this time or does not become tiresome to the patient, but however or whenever taken one or two quarts of milk should be consumed daily. In sanatoria all milk is obtained from tuberculin-tested cows or is boiled, the latter not being to my mind advisable. Raw eggs are also an essential part of the dietary, and are not infrequently swallowed in large numbers daily. Convalescent patients take their meals in a common dining hall, each person being provided with paper napkins that can afterwards be burned. Febrile or otherwise feeble patients receive their meals in their own apartments or in their chairs on the porches. In most sanatoria, physicians eat in the dining hall with the patients and encourage or actually compel the patients to eat as heartily as possible. It is a noteworthy fact that most tuberculous patients find their capacity and digestion increase as they persevere in hearty eating, and grow better nourished; such, at all events, has been my observation.

The third element of treatment is hydrotherapy. This is considered very important in Germany, but in England and America is often neglected. Feeble patients are given dry rubs at first and by degrees are accustomed to sponge baths with tepid water or dilute alcohol. As their resistance increases the temperature of the water is reduced and sponge baths are exchanged for douche, or shower baths, of tepid or cold water as determined by the medical adviser, and for a specified number of seconds, from five to forty.

The effect of this hydrotherapy is threefold: (1) It hardens the skin and thereby renders the patient less sensitive to changes of temperature and less liable to colds or internal congestions. As Dettweiler once said to me, the tuberculous patient is so sensitive to temperatures that would not be noticed as chilly by a healthy person that he may be said to have a disease of the skin as well as of the lungs. (2) Cold bathing stimulates the circulation and respiration, and (3) stimulates also nutrition. It is regarded, therefore, as a powerful adjunct to other measures, but one that injudicious-

ly employed may do harm by causing pulmonary congestion. If so administered as to be succeeded by vigorous reaction, i. e., a feeling of warmth and glow of the skin and a sense of invigoration or well-being, it is beneficial. If, on the other hand, the surface of the body remains cold and the invalid feels chilly and depressed, he should be covered warmly and given a hot stimulating drink, and made to lie down until reaction sets in and his fatigue passes away. When such unfortunate effects are produced it is because the bath was improperly given, too cold or too long continued. The temperature of the room in which the bath was given should be warm and vigorous friction by an attendant should always follow the application of the water.

The fourth essential in the proper management of these invalids is the close daily supervision of their medical advisor, or of a competent nurse, that they may not be left to their own caprice or whim. Such supervision does not mean, necessarily, that they are visited each day, although in a sanatorium this is possible and advisable, but that they are required to carry out faithfully the regimen laid down for them and live up to the doctor's instructions to the letter. It is only in this way that these invalids can be kept from committing indistreet acts likely to prove injurious or subvert the end in view. Too great stress can not be laid upon this fourth condition of successful management. The physician who would achieve gratifying results with this class of patients must be a veritable autocrat, who will not brook any violation of his instructions.

Finally, this part of the patient's education includes scrupulous carefulness with reference to his expectoration. He is taught to deposit his sputum in a proper receptacle and never allow it to fall on the floor or clothing.

The principles of modern sanatorium treatment having been thus stated, we now come to the second part of our subject, how it may be carried out in the patient's home. This is not always easy, and in some cases is impossible, especially in great cities and among the poor. Yet, if the physician will bestow necessary thought upon the problem, he will often

be surprised to find how well he can manage under difficulties and how eager the unfortunate victim is to aid in carrying out this line of treatment. The practitioner in the small town or country can have no excuse for not being able to enforce treatment along the lines laid down in this paper.

With rare exceptions, tuberculous patients show a febrile temperature, in incipient cases 99.5 degrees or higher, while as the process becomes more active or mixed the fever increases. Therefore, the indication is for mental and physical rest in the open air. This indication is imperative. The air should be free from dust and smoke, if possible, but even outdoor air thus contaminated to a moderate degree is preferable to indoor air. Personally inspect the patient's domicile and select a porch which, when properly screened in, will permit the invalid to rest in the fresh air without undue exposure to strong cold winds and rain. If a porch is not to be had, then have a tent or cheap shelter of boards erected in the yard and so arranged that the sides can be closed or opened according to the daily winds, remembering a southerly exposure is best and that the tent or shed is never to be wholly closed, for then it becomes no better than a room. All such shelters must be constructed with a view to perfect ventilation when it is necessary to keep three sides closed at once. If a clump of trees can protect against northerly winds, so much the better; while in hot summer weather it may be necessary to utilize their friendly shade.

If the patient is advanced and feeble, he may not be able to endure complete exposure to the outside air for more than an hour or two at a time in the middle of the day or during sunny parts of the day. Then, as his strength increases and the invalid grows accustomed to rest in the cool outside air, the time thus spent is lengthened by degrees until finally the entire day, perchance also the evening, is passed on the porch or in the shelter that has been erected. There may even come days when the state of the weather permits his resting in a hammock under the trees. Care must always be had that he does not become chilled, and to this end blankets and hot bottles are to be kept at hand, and if necessary there must

be an attendant who can briskly rub the extremities beneath the blanket, put on additional covering, administer a hot stimulating drink, etc. If, in spite of such precautions, a distinct chill is experienced, the patient must at once be removed to the house and further measures resorted to, to restore the circulation and counteract the effect of the chill.

Patients who are far advanced and already bedridden should be kept in their bedrooms, but the apartments are to be kept thoroughly aired. One or more windows should be kept wide upen, but the invalids protected by screens and sufficient clothing against draughts, so that their lungs may be supplied with plenty of fresh air, while their sensitive bodies are kept warm. In the winter time their rooms are to be heated, preferably when possible by a grate fire, but by no means are their apartments to be shut up tight as is only too often the case.

I have known a young man with advanced tuberculous phthisis to sleep in a room whose window was never closed, even when the thermometer sank to 10 below zero F. Not infrequently a poor consumptive lives in a small flat and occupies so contracted a bedroom that the only window is alongside the bed and can not always be safely opened, especially at night. Under such circumstances necessity may require the ventilation of the bed chamber through an adjoining apartment, but there are some days even in winter when the window of such a sleeping room may be safely opened. Bear it always in mind and impress it upon your patients, that if they are to get better, it must be through the instrumentality of fresh air.

The matter of exercise is so intimately connected with that of pure air that it may now receive consideration. It has already been stated that a febrile temperature contraindicates exercise. The higher the temperature, the more imperative does the enforcement of rest become. Two other conditions which contraindicate exercise are progressive loss of weight and cardiac feebleness. Now and then patients are observed who do not display fever, their temperature tending rather to be subnormal, but who lose flesh persistently, although slowly. Such a person should conserve his energies that the

food consumed, may go, not to supplying strength for exercise, but to improve the nutrition of the body, and therefore muscle energy must not be expended. Cardiac asthenia calls for physical repose the same as in cases of primary heart dlsease and for the same reasons that the skeletal muscles are to be spared. The weak heart requires all the nutrition it can get and must not be taxed more than is unavoidable for the maintenance of circulation.

When at length the patient's general condition has improved and in particular the body-temperature remains at or below 99 degrees F., and has so remained for a week or more, then a cautious trial of exercise may be made. Right here disastrous mistakes are apt to occur. The invalid is permitted to walk too far and brings on a recurrence of slight fever, which, because insignificant, is not noticed. At first the patient should be permitted to walk slowly for a few minutes, five being usually enough for the first trial, after which the temperature is accurately recorded and compared with that prior to the exercise. If the temperature is found to register one degree or more higher than before the walk, it indicates that the exercise was too much, and rest must again be enforced for awhile before another trial is made. It is only when exercise is found not to thus unfavorably affect the invalid that he is to be allowed to indulge in it daily. Even then the length of the walk must be very gradually increased and must be definitely prescribed by the doctor. As the walks become longer they should be broken by frequent rests on some convenient seat, and when over should be followed by rest on a couch, and if possible by a nap. . Moreover, time must be given for rest immediately after and before meals. Only in this way can the patient's strength be gradually regained and the patient be placed in condition to resume his former occupation. Those who are well advanced in their convalescence, and seem in a fair way to arrest their disease, should be advised to walk slowly up easy ascents for the purpose of improving their respiratory and circulatory systems. Care is necessary in this, however, and they must pause whenever the breath grows short or the heart begins to

pound. Unless the individual can be trusted to do this hill climbing judiciously, he had better not be allowed to attempt it at all.

What has been said already concerning the dietary does not need repetition, and I will only make a few additions for the sake of emphasis.

Milk, raw eggs and meat should be the staples of diet, while fruits, vegetables and deserts, although valuable chiefly for sake of variety and to supply to the system the requisite carbohydrates, are to be allowed in moderation. It is my experience that tuberculous patients usually have a dislike for substantial food, especially meats, and if left to themselves will eat only fruit or this and a little cereal for breakfast. In the first place impress your patient that he must learn to consume what will seem to him to be truly enormous amounts of wholesome food. Do not pay heed to his protestations, excepting in so far as to begin feeding him carefully, and in a way to correct what digestive disturbance may be present. Patients with high fever are to receive only fluid nourishment, as milk, broths and soups, albumen water, cocoa, etc., or if the morning temperature is normal, then solid, easily digested food in the early hours and liquids later in the day. I have repeatedly found that tuberculous persons who declared they had no appetite, and whose coated tongues bore testimony to the catarrhal state of their stomachs, would in a day or two develop positive desire for food if they were confined to hot water for a few hours or a cupful of quite warm milk every two hours for a couple of days or so. Taken in this manner without anything else, milk rarely disagrees, but if it does cause distress it may to advantage be diluted with some charged alkaline water, as Seltzer or Apollinaris. Absolutely pure milk possesses no unpleasant taste, but if it is objected to on this account, its flavor may be concealed by the addition of a little coffee, tea, cocoa, rum, etc. However taken, milk should always constitute a large part of the nourishment in these cases.

Nothing is better suited to the needs of these invalids than are eggs, and I will say, raw eggs. When raw they are far

more easily digested than cooked, even if soft boiled. They are better also swallowed whole than when beaten up in milk or as an eggnogg. These finicky patients almost invariably express disgust for raw eggs and declare they can not get them down, but I have rarely if ever failed to convince them to the contrary. They are told to have a fresh egg dropped into a wine glass without breaking the yelk, sprinkled with salt or covered with lemon juice or wine and then without stopping to look at it and think about it, to gulp it down as they would a raw oyster. In this way I have known patients to actually consume more than a dozen raw eggs daily in addition to much milk and other food. In my opinion, the eggs should be taken at the close of each meal, as so much additional to all the other nourishment they can eat.

Meats should always make up a large part of the consumptive's diet, but it should be properly cooked, never fried, and does not need to be so underdone as to disgust the patient. It may be changed from time to time for poultry, game and fresh fish, including, of course, shell fish. Bacon and ham are excellent for all who can digest them, since they supply an abundance of easily assimilated fat. Good butter should also be taken in as large amounts as can be tolerated. If simple salads with French oil dressing are craved, they may be permitted.

The dinner is to be at midday, but supper is not to be too light a meal, consisting merely of bread and butter, sauce and cake, but must contain some of the substantials that have been enumerated. Three meals daily are not enough, but are to be interlarded with lunches of milk, soup, cocoa, chocolate, etc., with or without a sandwich, and the invalid should have something of the kind before retiring to sleep, or during the night, if wakeful. A bowl of hot broth or beef tea containing a little rum, brandy or whisky will often relieve the cough and cold sweat which keep the consumptive awake in the small hours of the night.

Ingenuity, thought and patience must be bestowed on the patient's diet, not only by the nurse, but by the physician, and if these attendants are not willing or able to thus be-

stow requisite attention, they have no business to remain in charge of the case. These patients who are made to eat so heartily and are unable to take much exercise are apt to get coated tongues and now and then some temporary disorder of stomach or bowels. They may, therefore, be given a little calomel in divided doses, from time to time, with decided benefit. A word of caution is also necessary in regard to the stuffing of consumptives with extensively damaged lungs. The increase of blood pressure in the pulmonic vessels thus likely to be set up may give rise to haemoptysis, and hence a cathartic should occasionally be administered or the overfeeding be temporarily cut down. Time forbids further consideration of this part of the subject.

Hydrotherapy, in my opinion, is another feature in the management of tuberculous patients to which very great value must be attached. Its benefits have already been stated and do not need to be repeated. Bedridden invalids should be sponged off each morning with warm water to which alcohol or salt has been added, and this should be done under the clothes by a nurse who realizes the necessity of preventing the invalid from getting chilled. This bath is not to be given until the patient has received a hot stimulating drink, and it should always be followed by a brisk dry rub. If the vitality of the sick one is too low even for this, then a dry rub may be given.

Patients who are not so reduced and can leave their beds should have a sheet rub or be bathed by an attendant, but the water should be as cool as can be tolerated, and in no instance is he to be left without having shown good reaction. If this does not follow or he feels tired and unrefreshed, he is to be put to bed, covered up warmly and given a hot draught of some kind, and there remain until warm and the fatigue has disappeared.

In very early cases the patients may be permitted to give themselves a sponging, but they must be properly instructed on the temperature of the water and the manner of taking their bath. In the beginning the water is to be warm or tepid and its temperature gradually reduced as the resistance of

the individual increases. The bath must be a rapid one and immediately followed by vigorous friction of the skin with a coarse dry towel.

In time, it is generally possible for these invalids to endure quite cold water, while fairly vigorous convalescents can generally learn to bear and even enjoy a shower of cold water administered for a few seconds. I have had patients who endured and were benefited by a "pail douche" as it is called. That is, while one sits or stands in a tub, a pail of cold water is first dashed against the upper portion of the back and is immediately succeeded by a second pailful thrown against his chest. This rather severe proceeding to be followed by a hard rub by an attendant. This hydrotherapy requires care and judgment, but I have very rarely known a cold to be taken, and then it has always been ascertained that due care had not been exercised. I usually find that even when patients do not actually relish this part of their treatment, they admit that it makes them feel fresher and less sensitive to cold weather. They are able to keep warm with less clothing, which certainly is an advantage. Speaking of the clothing, let me say the tuberculous should wear wool next to the skin, and in particular should keep the upper part of the chest thus protected, not by a chest-protector, but by a high-neck undershirt. It is a mistake for them to wear so much as to keep their skin in a constant perspiration, as this predisposes them to chills and congestions.

Lastly, let me urge upon you the absolute necessity of these patients being kept under close supervision and compelled to obey instructions. Their daily life should be laid out for them and at each visit of the physician they should be required to give an accurate report of what they have done and have left undone. They should be visited by the doctor and not allowed to come to him so long as they show febrile temperature. Excepting in the case of convalescents, they should have a competent nurse to look after them, record temperature, etc. If a professional nurse can not be had, then some intelligent member of the family may be instructed in the proper care of the invalid. All orders ought to be given in

writing, that there may be no misunderstanding or forgetfulness. Bear constantly in mind that careful regulation of the consumptive's daily life is one of the essentials of successful management.

In conclusion, I would say I regard it as a grave mistake to keep the tuberculous in ignorance of his disease. If he knows what he has to fight, he fights intelligently and hence more successfully, whereas if kept in the dark he will be more likely to commit indiscretions because not fully alive to the importance of strict obedience. Moreover, if you do not state to him the real nature of his malady, how can you sufficiently impress him with the importance of your orders and of the measures taken in his behalf?

If you use drugs, employ them only to meet definite indications, but do not rely upon them.

XXII.—TENT LIFE IN THE TREATMENT OF TUBERCULOSIS.

A. M. HOLMES, M. D.
DENVER, COLO.

Out-of-door life as a treatment for tuberculosis is by no means a new theme. It is, however, one that is year by year growing into increased importance. For many years this method of treatment has been strongly advocated by such men as Brehmer and Dettweiler, of Germany; Bennett, of England; and Trudeau, of our own country. The world, however, has been slow to profit by the results of their experience.

Even today it is a surprising fact that a large percentage of those afflicted with tuberculosis give a history of having worked in poorly ventilated offices. For years they have slept in rooms with windows closed. Ventilation is a subject that frightens them. Hence, it requires some courage to advocate the radical reform of out-of-door and open-air life.

TENT LIFE.

It has been my good fortune, during the last five years, to see much of tent life in Colorado. I have availed myself of

the opportunity to experiment along this line and have carefully noted the results. These observations have been made with a view of ascertaining the practicability of tent life in the treatment of tuberculosis.

My first experience with this method of treatment was secured under more or less unfavorable conditions. Tuberculous patients coming to Colorado almost invariably manifest a tendency to flock to the larger cities. By this course they fail to realize the advantages of the climate. Lack of means compels many of these patients to avail themselves of remunerative employment. Under existing conditions the best they can do, if they are successful in securing employment, is to seek a residence in the suburban district, which furnishes them an opportunity to breathe purer air when not employed.

My first experiments were made in the more thickly settled parts of Denver. Tent sites were secured on unused parts of lawns adjacent to the buildings where patients arranged to take their meals. Even with these uncongenial environments the results were good. Realizing the impurity of the air in these central localities, I advised my patients to try the suburbs of the city. The results obtained by this method were more marked. This led to the selection of rural and mountain sites for tent colonies. In these districts I have secured my best results. This is due to a purer air and the ability to establish and enforce a more rigid discipline.

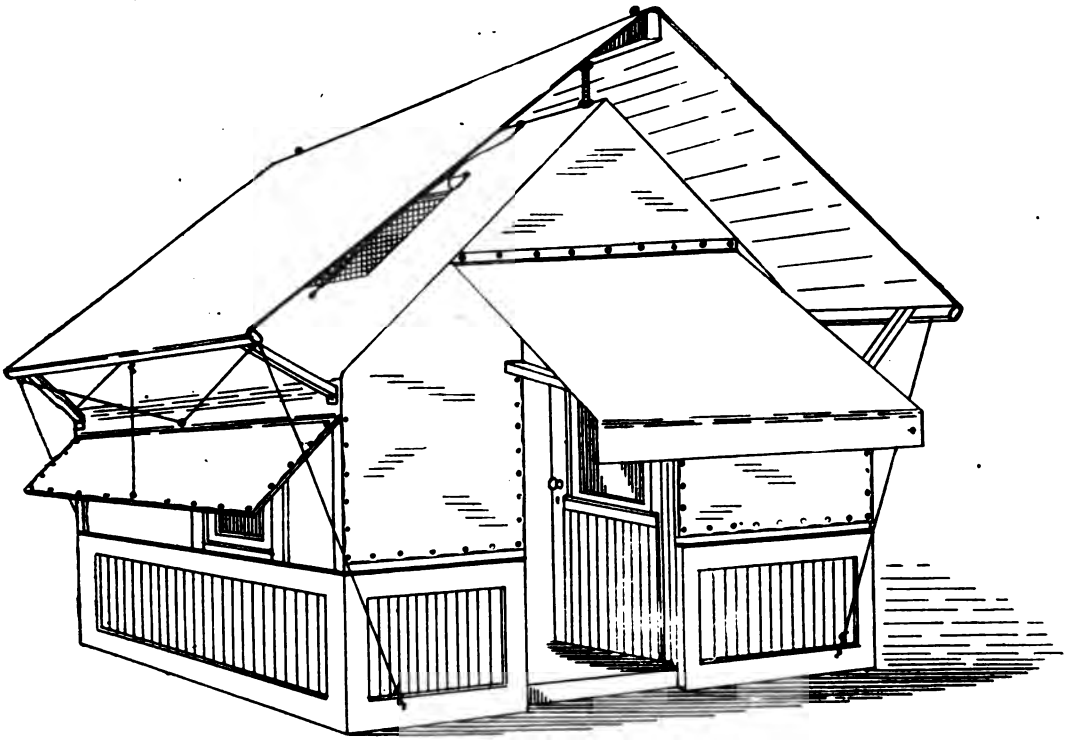
Many patients have attempted tent life without the systematic rules necessary to overcome the hardships and inconveniences so often experienced. A careful study of the subject has made it an easy matter to suggest remedies.

Another difficulty which I have constantly met with is the tendency on the part of patients to limit the period of tent life to a few months during the summer and fall. For the purpose of making a practical test during all seasons of the year, I found it necessary to formulate a system of rules and to make radical changes in tent architecture.

TENT ARCHITECTURE.

Tent architecture is one of the chief factors upon which

the success of tent life depends. The *ordinary wall tent* is the simplest form in use. This form has undergone many improvements. Probably the best tent yet devised is the *Munson Sanitary Tent* recently adopted by the United States Army. I have introduced this tent into our sanatorium during the past year, and of all forms we have tried, it gives best results. Even with the improvements and devices that



TENT COTTAGE.—Roof window open, side wall converted into awning.

have been proposed, I have been unable to find a tent that gives entire satisfaction during all seasons of the year.

THE TENT-COTTAGE.

After many attempts, the inconveniences which I have heretofore encountered have been overcome by combining the advantages of a tent and those of a cottage, constituting what is known as a "tent-cottage." I shall attempt a brief description of the *Sanitary Tent-Cottage* which I have adopted.

Principles of Construction.—This cottage is built of a framework of lumber upon a floor 10x12 feet in dimensions. The wall is five feet high. This frame is covered with heavy canvas in the form of an ordinary wall tent; the tent wall being 2½ feet, reaches within 2½ feet of the ground.

Eave Ventilation.—The cottage is constructed with double walls. The inner wall consists of heavy canvas extending from the floor to the full height of the walls. The outer wall is separated from the inner wall by an air space of four inches. The outer wall consists of two sections. The lower half (2½ feet) is made of half-inch lumber, to be known as the wainscoting; the upper half (2½ feet) consists of the wall of the tent proper already explained. An open space of two inches is left between these two sections of the outer wall. This opening extends around the entire tent. The air passes through this two-inch opening and thence upward through the four-inch space between the inner and outer walls and enters the tent at the eaves or the top of the walls. For want of a better term I have called this the "eave ventilation." This system permits the air to enter the tent through both sides and ends by means of a continuous open space, without producing a draught in any portion of the tent.

Roof Ventilation.—A system of "roof windows" has also been adopted, which is inexpensive and can readily be manipulated by the patient from any part of the tent.

Windows.—Windows have also been designed for the rear end and either side of the cottage and for the upper half of the door. These admit the sunlight and may be opened and closed by a system of ropes, pulleys and weights. The windows are covered exteriorily by mosquito netting or a wire screen to prevent insects from entering when they are open. A screen door may also be used in summer.

Tent Pavilion.—By a simple mechanism the upper half of the outer wall of each side and the rear end can be converted into an awning, which changes the "tent-cottage" into a "tent-pavilion." A similar mechanism may also be applied to the upper half of the inner wall. By this means the walls are practically removed, permitting a free circulation of air

through all parts of the interior of the tent, and at the same time the patient is protected from the hot sun of summer days. These may be opened or closed at will. During the winter they are closed. Mosquito netting may be substituted for the heavy canvas of the inner wall during the hot months of summer, when so desired, at very slight expense.

The Fly.—The tent-cottage is provided with a fly, which is elevated six inches above the roof of the cottage and projects one foot at each end and at each side. This protects the cottage from the hot sun, the snow and rain. It further facilitates the ventilation of the tent, adds comfort and increases the strength and durability of the structure.

Portability.—Finally, the entire structure is held together by a special *system of bolting.* By removing eight bolts the frame of the structure is separated into five parts, which renders it easily portable.

Cost.—The approximate cost of constructing such a "tent-cottage" is $60.

Advantages.—Points considered in the construction of the "Sanitary Tent-Cottage": Stability, durability and portability; lightness of material and economy of construction; ease of manipulation and economy of space; it provides the maximum of heat, light and ventilation; may be used in any climate, and is much cheaper than an ordinary cottage. Realizing the difficulty of giving a description of such a cottage, I have prepared a model which is on exhibition for the inspection of those who are specially interested in the subject.

RULES GOVERNING TENT LIFE.

Tent life, to be made ideal, must be governed by exact discipline. For sanitary purposes, tents and tent-cottages should be carefully tended and should be fumigated at regular intervals. All bedding should be periodically exposed to the air and sunlight. The floors should be kept scrupulously clean.

A tent should be occupied by but one person. When a tent is used chiefly for sleeping purposes a floor is not an absolute necessity, although it is a luxury which adds much to the comfort of the patient. The sanitary condition can be more easily regulated with a floor. In dry climates,

possessing a sandy and porous soil, the floor can be dispensed with, especially if economy is an important point with the patient. A tent without a floor is not to be recommended for a prolonged residence. Tent life is, or should be, practically an all-day, all-night, and an all-the-year-round out-of-door life.

It should be remembered that a tent is intended chiefly as a sleeping apartment. The tent-cottage, however, can be made an ideal living room in which the purity of the air can be maintained and the temperature regulated during all conditions of the weather.

Tent life, when governed by well selected rules, becomes thoroughly enjoyable. Before beginning such a life, however, patients almost invariably entertain exaggerated ideas of its dangers and inconveniences. A short trial soon dispels this fear and they are with difficulty induced to return to an indoor life.

RESULTS OF TENT LIFE.

The results of tent life, studied clinically, may be briefly summarized: The appetite increases; nutrition improves; cough disappears; night sweats cease; sleep improves; weight increases; temperature falls; tendency to "take cold" diminishes; respiration improves; and the pulse rate diminishes.

SUITABLE CASES.

Marked improvement has been observed in all stages of the disease as a result of tent life, but early cases and those well advanced in convalescence offer the best results. If a case is hopeless, by all means let the patient remain at home in the midst of his family and friends.

TREATMENT.

During recent years there has been constant experimentation in the treatment of tuberculosis. If these experiments have demonstrated anything it has been that the closer patients are brought to primitive Nature the better the results; and the nearer they are confined to artificial conditions the greater the ravages of the disease. In other words, tuberculosis is a disease that arises from artificial conditions; it is a disease that Nature, unmolested, seldom ever prop-

agates. Hence, if we hope to find a successful treatment for tuberculosis we must substitute primitive Nature for the artificial conditions of modern civilization. The conditions of primitive Nature are fresh air and sunshine, good food and cheerful surroundings. These conditions are found in an out-of-door life.

PREVENTION.

If primitive Nature possesses conditions capable of reinforcing the vital functions of the patient and checking the tuberculous process, we may with confidence look to the same factors as the best means of preventing the disease.

Vaughan has estimated that, at the present death rate from tuberculosis, 10,000,000 or more of the 70,000,000 people now living in the United States will die of tuberculosis unless something is done to prevent it.

There is much that can and should be done. Statesmen, municipal authorities, physicians and philanthropists should unite to establish sanatoria. A campaign of education, which is now in active operation, will do much toward giving the masses a clearer conception of the nature of the disease, will assist them in decreasing the sources of infection and increasing their resisting power, which will be the means of preventing and curing it. The day is not far distant when sanatoria providing tent life the entire year will be considered the ideal institutions for the treatment of tuberculosis. A resort best suited for such institutions should be within or adjacent to a pine forest; it should possess a congenial and attractive environment with an eastern or southern exposure; with a sandy or porous soil and good drainage; with pure, dry and cool air, and a maximum of clear days and bright sunshine. There should be well regulated sanitary rules and strict discipline, and a management that will give good, wholesome food and light employment when patients are able and willing to take part in productive industries.

Those who cannot avail themselves of Nature's best resorts, rich in ozone and fragrant with pine balsams, should adopt the next best course and live a tent life at home.

XXIII.—WHAT CLASS OF PULMONARY PATIENTS DO WELL IN COLORADO?

BY W. A. CAMPBELL, M. D.,

COLORADO SPRINGS, COLO.

"No pathologist of repute will dispute the assertion that tuberculosis is present in two-thirds of mankind. It is universally conceded that two-sevenths of mankind succumb to tuberculosis of the lungs alone. Including cases of intestinal, bone, joint and gland infection, it would be perfectly safe to raise the limit that minute amount which would bring the fraction to two-sixths. We will say, therefore, to be within the limits of perfect safety, that two-thirds of mankind are affected with tuberculosis, and one-third dies of the disease."

The foregoing statement was made by the late Dr. Jas. T. Whittaker in a paper read at the medical section of the Amercan Association, in Denver, in 1898. Many of those who heard the paper thought the statement an extreme one. When we stop to consider what it says and means, we are confronted with one of the most serious propositions before the medical profession to-day and in days gone by. Ravages of the plague, smallpox and cholera dwindle into insignificance when compared with those of tuberculosis in its manifold forms. It enters our household like a thief in the night, and takes from us the fairest of the number. Those attacked are not always responsible for the invasion of the destroyer. It may come as an inheritance; it may come from environments beyond the control of the individual having it; it may come as the result of devotion to science; or it may come when caring for a loved one. No difference how it comes, it is an unwelcome and dangerous guest.

Often those attacked are able to battle successfully with the intruder and come out victors. They do not always know of the presence of the enemy. That there are many unrecognized and cured cases of tuberculosis occurring in the practice of every medical man cannot be denied. Recognizing this fact, and in confirmation of it, Knopf has com-

piled a table which shows that of all autopsies of those dying from causes other than pulmonary tuberculosis, healed tubercular lesions were found in the lungs of 25 per cent.

It is not our purpose to enter further into the consideration of the prevalence of tuberculosis. Enough has been said to suggest, if not to prove, the prevalence of the malady, both recognized and unrecognized. Such being the facts, does it not behoove thoughtful physicians, in whose hands the life and health of this country are placed, to study well the proposition as to what to do with these suffering millions? We are pleased to note that the physicians and the public benefactors are recognizing the importance of giving this subject their most profound thought. Sanatoria are being established in many of the Eastern states, and the disease treated with much more success than it can possibly be done in a private home. Our great Western sanatorium, the eastern slope of the Rocky Mountains, holds out great inducements to the stricken ones. Its altitude; its beautiful mountain scenery; its pure air; its sunshine and its dryness, all beckon them to come. The sick are ever ready and eager to try something new that bears the promise of benefiting them. This desire on the part of the pulmonary tubercular subject is more noticeable than in any other disease. Many who come to our state would do very much better and have been much more comfortable at home than they were by coming. Hence the necessity of studying the character of the patients sent to Colorado, and "What class of pulmonary patients do well in Colorado?"

I know no better way to work out this problem than to analyze a series of cases sent to Colorado by the physicians of the great Mississippi Valley. In doing this I do not want you to consider for a moment that I am criticising you as physicians for sending many of these subjects to Colorado. Many of you are at sea where to send these patients, who are clamoring for relief and demanding that you do something or send them somewhere. Therefore, if what I show you will, in a degree, help you in this ordeal, my paper will not be for naught.

As I wish to show you the character of the patients on arrival in Colorado, and, as nearly as possible the outcome of the cases, I have excluded all except those who had recently arrived in our city. Adhering strictly to this classification or assignment of cases, my percentages are slightly at variance with those of physicians who consider in their statistics all cases coming under observation. In my effort to be terse I fear that I may not at all times make my language clear.

Of the 250 cases which I report to you, 129 were in males and 121 females. The benefited in the males were 60 per cent.; in the females, 50 per cent. The apparent better results obtained in the males can be accounted for by the fact that of all first-stage cases 65 5-7 per cent. were males and only 34 2-7 per cent. females. In the first-stage cases the benefited reached 92 per cent.

The average weight was 118 pounds. The average age was 29 4-5 years. There were 21 who were 20 years and under, in whom the mortality was 51 per cent.; 120 who were between 20 and 30 years, and 109 were 30 years and over. There were 125 married and 125 single. Social conditions made no material difference in the disease or results. Twenty-nine states and five foreign countries furnished the cases. They were as follows: Illinois 47, Missouri 28, Ohio 27, Iowa 23, New York 17, Pennsylvania 11, Indiana 11, Massachusetts 8, Nebraska 7, Michigan 7, Kansas 4, New Jersey 2, Kentucky 7, Rhode Island 6, Wisconsin 5, Texas 4, Minnesota 4, Vermont 3, Delaware 2, North Carolina 1, Louisiana 2, California 1, Mississippi 1, Alabama 1, Indian Territory 1, Arkansas 1, Maine 1, Oregon 1, Colorado 1, England 5, Canada 7, Ireland 2, Austria 1, and Sweden 1.

One hundred and fifty came from families having a tubercular history. Of this number 51, or 34 per cent., are known to have died; 53 per cent. were benefitted by coming; the remaining 13 per cent. are those who have not improved or of whom we have no history. Most probably the latter class are doing poorly or are dead. It is composed of those who are far advanced in the disease, are restless and drift on of their own accord, or are advised to do so by their physician on

account of complications that unfit them for high altitudes. This class has to be considered in all my percentages.

Of the 100 who had no family history of tuberculosis, 30, or 30 per cent., are dead; 59 per cent. were benefitted, and 11 per cent. are of the unimproved and those with no history. We note that the percentage of deaths is greater in those of tubercular history, and the percentage of those benefited less.

There were 21 in whom the first evidences of the disease had not existed longer than three months. Of this number 73 per cent. were benefited, 19 per cent. died and 8 per cent. were of the unimproved and those with no history.

There were 84 in whom the disease had existed longer than three months and less than one year. Of this number 56 per cent. were benefited, 35 per cent. died and 9 per cent. were of the unimproved and those with no history.

There were 145 in whom the disease had existed for one or more years. Of this number 52 per cent. were benefited, 33 per cent. died and 15 per cent. were of the unimproved and those with no history. We note that, as the length of time of having the disease increases, the percentage of those benefited decreases.

The left lung was involved alone in 64 cases. Of these, 66 per cent. were benefited, 20 per cent. died and 14 per cent. were of the unimproved and those with no history.

The right lung was involved alone in 88 cases. Of these, 68 per cent. were benefited, 22 per cent. died and 10 per cent. were of the unimproved and those with no history.

Both lungs were involved in 98 cases. Of these, 28 per cent. were benefitted, 50 per cent. died and 22 per cent. were of the unimproved and those with no history. It will be noted that the percentage of those benefited is slightly in favor of the right lung. Also that the right lung is more frequently affected than the left. Further, we note the high percentage of deaths when both lungs are involved; also the low percentage of those benefited and the large number of unimproved and those with no history. The latter is due

to the sending away from the high altitude of those of greatly diminished lung capacity; hence we lose their history.

There were 70 in the first stage of the disease. Of these, 92 per cent. were benefited, 1 3-7 per cent. died and 6 4-7 per cent. were of the unimproved and those with no history.

There were 110 in the second stage of the disease. Of these, 54 per cent. were benefited, 32 per cent. died and 14 per cent. were of the unimproved and those with no history.

There were 70 in the third stage of the disease. Of these, 13 per cent. were benefited, 62 per cent. died and 25 per cent. were of the unimproved and those with no history.

We note the rapid decline in the number benefited as the disease advances, falling from 92 per cent. in the first stage to 13 per cent. in the third stage.

Of the total number of cases 17 3-5 per cent. were cured. There are no symptoms whatever of the former disease except a diminution of vesicular murmur and in some cases a slight dullness in the former consolidated area; 38 2-5 per cent. were benefited. In 90 per cent. of those who are classified as benefitted two years or more have elapsed since they came to Colorado. This was formerly considered the average duration of the disease. If at the end of two years our patients are living and in a better condition than on arrival, they can be counted with those who are benefited. This rule is the one followed in this paper. These people are now able to live in comfort, and many of them are engaged in gaining a livelihood. A portion of this latter number will no doubt continue to improve and will later be classed with the cured. The total number benefitted by coming to Colorado is 56 per cent. This is a lower percentage than is usually given for all classes of cases, but I have not put into this classification those who have done well for a time, and then gotten worse. The latter are classed with the unimproved and those who have no history, and constitute 12 per cent. Death has claimed 32 per cent.

The only complication that I shall call your attention to is hemorrhage. There were 98, or 38 per cent., who had hemorrhages. Of this number 16 per cent. were cured, 32 per

cent. improved, or a total of 48 per cent. benefited. Of the 155 cases without hemorrhages, 19 per cent. were cured, 41 per cent. improved, or a total of 60 per cent. benefitted. We note that hemorrhage made the chances of recovery slightly less in this series of cases. This fact has been observed in the East as well. The percentage of recovery is no less at a high altitude than at sea level. With you in low or intermediate altitudes the question arises as to whether you should send your hemorrhagic cases to Colorado. The answer should be yes, other complications not interdicting. Experience has shown that hemorrhagic cases do well in Colorado when the hemorrhage occurs early in the disease. Patients from the East often start for Colorado and have a hemorrhage in Kansas City or Omaha. They fear to continue their journey, having been told that high altitudes conduce to hemorrhages, and accordingly return home or proceed on their journey with fear and trembling. This is all a mistake, and should not be encouraged by the profession. As they proceed to a higher altitude, physiological changes take place. The heart may act more rapidly, but the arterial tension is lowered. The diminished atmospheric pressure has caused a dilation of the external capillaries over the surface of the body; thus with more blood distributed to the peripheral capillary circulation and with a dimished intravascular tension, the vessels of the diseased tissue are not under so great a tension and the chances of hemorrhage are less.

You will note that 54 per cent. of those in the second stage of the disease and 13 per cent. of those in the third stage are benefitted. Although this improvement may be only temporary, two years or more, it holds out a hope for those who have delayed their coming to Colorado. Life may be a burden, but at the same time they want to put off the final hour as long as they can. When the home physician has done all he can for them, and no longer has a remedy to stimulate their hopes, they naturally look to the last resort and make a change of climate. Their lives may be prolonged, even in those cases which finally end in death in a few months, but it is often a question whether this prolongation is justifiable

when we consider how they are deprived of home and all it signifies. These are the cases in which a physician has to do good work. It is plain to him that all first-stage patients are benefitted with but few exceptions. But to be able to advise in advanced cases he must use good and tried judgment. It is better, perhaps, to err in sending cases that should not come, than to keep from sending cases that ought to have come.

In selecting cases for high altitudes, do not send those with acute miliary tuberculosis. Do not send phthisis florida cases. Those with excessive nervousness, irregular and rapid hearts and high temperatures do not do well. Let them remain at home for a time until the acute attack has subsided. Cases well advanced with rapidly breaking down of lung and high temperature should not come. Those having cardiac dilatation or acute endocarditis or myocarditis should not come. A cardiac murmur is no contra-indication if there be no dilatation or if compensatory hypertrophy has taken place. Those having Bright's disease should not come. Advanced laryngeal cases or advanced intestinal cases do not do well. Advanced fibroid cases de not do well, as a rule. They suffer from dyspnea owing to want of lung elasticity and the rarefied air.

It is important that those coming have sufficient means to support themselves for a time after their arrival. After they become acclimated and their improvement is well established, it is well for them to have some light, properly selected employment. In this way their minds are engaged, and they, in a degree, overcome their homesickness, which is one of the most depressing things we have to meet. When it is husband or wife, father or mother, that is coming, the whole family should come if their finances will permit. Do not send them to Colorado with the promise that they can return home in two or three months, cured. Neither should you send them weighted down with numerous prescriptions, one for every symptom they have or may be likely to have. Such things are absurd. Tell them to go to Colorado, select the place they like best, choose their physician, and follow his directions closely. If you will do this, the physicians of Colo-

rado, aided by the best climate in the world, will show you their best results.

In conclusion, allow me to make an appeal in behalf of the tubercular subjects that will come to the members of this association in the future. From the study of the first-stage cases under consideration to-day, we find 59 per cent. were cured and a total of 92 per cent. benefited. Compare, if you please, these percentages with those who come in the later stages of the disease, or after the disease has existed for many months, or when they have delayed in coming until both lungs were affected, and your duty is very apparent. Be ever alert and on the lookout for the first evidences of tuberculosis. Make a thorough investigation, both physical and microscopical, and if still in doubt use the serum. As soon as convinced of the existence of tuberculosis, advise them to go to a sanatorium arranged for the proper treatment of this disease, or to the great Western sanatorium where the Master has arranged for their cure. We all know, only too well, the futility of trying to treat these patients successfully in their own homes. Let your watchword be: Early detection and early protection.

XXIV.—CLIMATIC AND ELECTRIC PECULIARITIES OF COLORADO FAVORING RECOVERY IN PULMONARY AND OTHER DISEASES.

BY J. E. MACNEILL, M. D.,
DENVER, COLO.

In considering the subject indicated by the title of this paper, the assumption is a plausible one that the large majority of the members of this Association have never by personal observation or experience familiarized themselves with Colorado.

While much has been written on the subject and may be learned from research, the time and attention of a large majority of physicians at a distance are too closely occupied by the demands of their local practice to admit of careful

study in this direction. It is, therefore, with the desire to add somewhat to their interest, and possibly to their information, regarding the health-giving and health-restoring advantages of the Centennial State, that I appear before you, and with no desire to make my comparison or statements prejudicial to any other state or locality. Nor is it so much my purpose to treat the subject from a scientific or theoretical standpoint, as to state well attested facts, calling the attention of medical men and of all others who may be interested, to a state possessing such varied and abundant advantages for all classes and conditions of men, whether in the fullest enjoyment of health or seeking it.

A resident of nearly two decades in Colorado, coming from about the sea level—namely, Chicago—where I had resided for a quarter of a century and had become broken down in health and spirits, has year by year added to my convictions that, in a large proportion of human ills, and especially such as have passed beyond the acute stage, far greater hope can be held out for complete recovery, and far better results obtained than at the lesser altitudes approximating sea level, or in localities contiguous to large bodies of water, resulting in increased humidity and often in unavoidable malarial and other health-detracting influences.

Physical Characteristics of Colorado Affecting Its Climate.—Colorado is an empire by itself. One of the six largest of the forty-five states, with an area of nearly 104,000 square miles, it extends 380 miles east and west, and 280 miles north and south. To the north lies Wyoming, to the south New Mexico, to the east Kansas and Nebraska, and to the west Utah. It includes a territory equal in area to that af all the New England States, plus Ohio or Illinois—or nearly equal to New York, Pennsylvania, New Jersey and Deleware, or to England, Ireland, Scotland and Wales. Of this area about one-third to the eastward from Denver, Colorado Springs, Pueblo, Trinidad, Fort Collins and Greeley, or about 40,000 square miles, is an immense plain, comparatively level, and sparsely timbered, while some 60,000 square miles to the westward are largely mountainous, comprising many moun-

tain ranges traversing the state in a general direction from north to south.

Included in this mountainous area are four great systems of natural parks, with an elevation varying from 7,000 to 9,000 feet above sea level. Commencing at the northern portion of the state, at 41 degrees north latitude, comes North Park, with an area of 2,500 square miles, or twice that of Rhode Island. It is 75 miles in length by 50 miles in width, with an altitude of 9,000 feet, while the mountains environing it rise from 4,000 to 5,000 feet still higher. In no other portion of the globe is there a more perfect paradise for the hunter, while the many streams winding their way through this great plateau are the abodes of myriads of fish.

Next, to the southward, and separated from North Park by a mountain range, comes Middle Park, somewhat larger than North Park, containing about 3,000 square miles, and quite similar thereto in many of its physical characteristics. Within its boundaries lies the famed Grand Lake, one of the most beautiful inland lakes on the continent and one of the largest in Colorado. In about its center, and covering an area about a mile square, it appears to be bottomless, the deepest soundings ever made failing to reach the bottom.

But ten miles away are located the still more famous Hot Sulphur Springs, six in number, in which the waters boil up from the base of a cliff at a temperature of 117 degrees F., and for drinking and bathing possess remarkable virtues in diseases of the liver, kidneys and skin, also in dyspepsia and rheumatism and allied complaints.

To the southward from Middle Park, and separated therefrom by the great Snowy Range, comes the beautiful South Park, some 50 miles in length by 20 to 30 miles in width, with an area of about 1,000 square miles. This lies about 75 miles southwest from Denver, and comprises the area in which were first discovered the rich gold mines that in the early days, some forty years ago, made Colorado famous. Here, also, are found mineral springs in various localities possessing waters of well known medical virtue. The average elevation of South Park is 9,000 feet.

Some 50 miles further to the southward, and separated by several mountain ranges, lies the largest of all these magnificent mountain ampitheatres, known as San Luis Park, with an area of some 10,000 square miles. It is elliptical in form, and some 100 or more miles in length by 60 miles in width, and comprises the famous agricultural region of southern Colorado. It is bisected by the great river Rio Grande del Norte, which flows through its entire length. It also contains a beautiful lake of the same name, miles in length, which has no known outlet although fed by some eighteen or twenty streams. Within its borders are seventeen mountain peaks at very equal distances each from the other, the loftiest being Sierra Blanca, standing alone in its magnificence and grandeur, crowned with perpetual snow, and rearing its towering head 14,483 feet above sea level, or 336 higher than Pike's Peak. The average elevation of San Luis Park is 7,500 feet, and it is surrounded by mountains rising from 4,000 to 7,000 feet still higher than the plain, which is remarkably level.

Traversing this magnificent plateau of fabulous beauty and resources, nearly through its entire length, passes one of the great arteries of Colorado's world-famous scenic railway system—the Denver and Rio Grande, which here presents one of its many remarkable features in railway construction, being a direct tangent 52 miles in length, and without a cut or fill during its entire length, and this at an elevation of 7,500 feet above sea level. The lands in all these great parks are rich in nutritious grasses and wonderfully productive in grains, vegetables and fruits of all kinds wherever cultivated.

Those who imagine that there are no lakes in Colorado will be surprised to learn that this mountainous area alone contains a thousand or more, besides over 250 rivers and many smaller streams that are mostly fed by melting snows stored in the mountains thousands of feet above until such times as the moisture is needed below. Truly, a wise provision of Nature, and one that adds to the state's productiveness and resources!

Within this area are also stored Colorado's vast and incalculable mineral riches, inexhaustible in extent for many

generations to come, secure in their Nature-encased vaults, until such time as the enterprise and genius of man shall discover and utilize them—gold, silver, iron, lead, copper, coal, marble, granite, petroleum, etc.—towards the discovery, exploration and recovery of which scarcely a beginning has yet been made. Centuries will be required to explore their boundaries and values and reveal to the world the incalcuable riches of the Centennial State.

It can, therefore, be readily understood that in this wonderful variety of climatic conditions arising from the different altitudes of mountain and valley, in the course and direction of its unnumbered mountain ranges, its proximate and remote mountain streams, lakes and water courses, its innumerable resorts at various altitudes more or less protected at any and all seasons of the year from the heat of summer and the rigors of winter, its 300 days, out of the 365 each year, of sunshine and cloudless skies, its entire freedom from malarial influences, advantages and conditions prevail that cannot be improved upon in any other state or country, conducive to health or to recovery from diseased conditions.

The atmospheric conditions at all seasons of the year are such that by careful study of the requirements of the patient, localities may easily be reached that will afford the best possible opportunities for recovery.

Within this great mountainous area of nearly 300 miles north and south by 200 miles east and west, are nearly 150 snow-capped mountains peaks ranging from 13,500 to nearly 14,500 feet in height, 72 of them being unnamed, and 26 being higher than the famed Pike's Peak. Within this area are also many valleys of almost winterless temperatures. The same altitudes at different places afford climatic conditions differing entirely, owing to variations in the trend of the valleys in which they lie and to their exposure to winds and to the sun's rays. The ever constant and important conditions of sunshine, dry air, and blue sky, common to all habitable portions of the state, form its basic health-restoring and health-sustaining qualities, equally advantageous to the sick and to the well.

Mineral Springs of Colorado.—As the world's greatest storehouse of minerals of every description, this immense area of geological and chemical wonders would be strangely incomplete without mineral springs of every known variety, and such it possesses in large and varied measure.

Diseases that often defy scientific treatment readily yield to Nature's remedies, epitomized in waters flowing fresh from God's unseen and fathomless fountains, possessing healing properties beyond the skill of man to duplicate.

Chemical analysis and scientific comparison show that, within this great area of phenomenal riches and resources, the waters that are famed for their medicinal virtues found in any other portion of America, or in Germany, Austria, France, or Switzerland are all duplicated, and that springs here exist that must eventually be known to the ends of the earth for their medicinal health-giving and healing properties, thus again adding to the renown of the Centennial State and making it a Mecca to which pilgrimages will be made by countless numbers, for the benefit of waters that shall forever flow "for the healing of the nations."

Some Generally Accepted Facts Regarding Mountain Climates Applicable to Colorado.—After all the discussions that have been indulged in regarding the relative advantages of mountain climates as compared with altitudes approaching sea level, as health-restorers in many diseased conditions and as health-promoters where no serious abnormal conditions exist, certain accepted facts stand out prominently, that must at once appeal most forcibly to all physicians as conditions of decided advantage in favor of great altitudes.

Elevations of 5,000 feet, and more, above sea level may be regarded as mountain climates. Common to all such elevations, varying with local conditions, may be mentioned:

1. Pure air, with relative freedom from noxious gases and from irritating substances floating therein, as dust, etc.
2. Diminished atmospheric density.
3. Reduction in temperature.
4. Diminished humidity.
5. Powerful insolation as to both heat and light.

It would hardly seem necessary at this time to emphasize the fact so generally understood and accepted, as to the relative purity of the atmosphere in mountainous regions, usually sparsely inhabited, when compared with the atmosphere of lesser altitudes pregnant with organic and inorganic forms of various substances that thrive so abundantly where the conditions are favorable for their growth and existence in more humid atmospheres, in thickly settled localities with inefficient drainage and surroundings favorable to the generation of deleterious gases from decomposing substances, animal and vegetable, and subject to malarial and miasmatic influences.

Atmospheric density diminishes as we rise above sea level in a ratio varying from 12 per cent. at 2,500 feet to about 25 per cent. at 7,500 feet.

The diminution in temperature as we ascend above sea level amounts to about one degree for every 300 feet.

The diminished absolute humidity of the greater altitudes, especially noticeable in Colorado along the entire foot-hill region on the eastern slope of the Rocky Mountains, is doubtless increased by the presence of a quickly absorbing and drying soil and the absence of frequent and prolonged rainfall. Also, in the greater altitudes, that the sun's rays are more direct and powerful, and of longer duration, forms a factor of great importance, both to the invalid and also to those who are not to be included in this class.

Along the entire sun-kissed eastern Rocky Mountain slope of Colorado, extending for 400 miles north and south, the sun shines brightly about 62 hours out of every possible 100, while along the Atlantic coast it averages less than 50; there, too, the sun's rays are lessened in force and directness and largely counteracted much of the time by clouds, fogs, mists, and dense humidity, which in Colorado are for the most part unknown quantities and conditions.

During the winter months the contrast is still greater. In Colorado we have from December to March 56 per cent. of all possible sunshine, while along the Atlantic coast the aver-

age is but 37 per cent., thus showing a vast advantage in favor of the greater altitudes of Colorado.

Taking periods of ten years in Denver as compared with the same periods in more eastern cities at about sea level, we have an average of 314 clear, or partly clear, days annually, while in Chicago the average is but 251 days and in New York 262 days. Such figures as these speak for themselves and need no further comment.

Of incalculable advantage also is the early morning sunlight throughout this entire eastern portion of Colorado, as also very generally throughout the more mountainous portions, with its warmth and brilliancy as cheering as it is also beneficial in the early part of the day, either to the invalid in hastening recovery, or to those in health in sustaining and prolonging life. And it is to be noted that the purity of the air depends largely upon the amount and intensity of the sunlight passing through it.

Value of Great Altitudes with their Rarefied Air and Direct Sunlight in the Treatment of Abnormal Conditions.—It would be difficult to name in any disease or abnormal condition in the treatment of which a pure, aseptic, rarefied, clear, stimulating, sunny, dry atmosphere is not an inexorable requisite in accomplishing the best results. Medicinal remedies may or may not be demanded, but pure air and pure water—Nature's sovereign remedies—must not be forgotten or denied. Wherever these can be found, there the sick or the well best thrive and there the percentage of longevity will increase the most rapidly.

The researches and observations of climatologists of high standing in the profession and in the confidence of physicians the world over, who have for years past made a careful study of the relative advantages of great altitudes as compared with those approaching sea level, almost without exception as regards pulmonary diseases or tendencies in this direction within the possible curative stages, give the preference to the greater altitudes.

Dr. Charles Denison, of Denver, and Dr. S. E. Solly, of Colorado Springs, who have made such careful observations

during twenty-five years or more past as their large opportunities have afforded, together with many physicians of the state and elsewhere, less widely known, may be mentioned in this connection; as also Dr. C. T. Williams, Dr. Herman Weber, and Dr. W. H. Walsh, of London; Dr. Jaccoud and the late Dr. Jourdanet, of Paris; the late Dr. Carl Rudei, formerly of Denver and later of Davos Platz, Switzerland; Dr. Archibald Smith, of the Peruvian Andes, and others of note, all men of eminence and of large experience and observation in the treatment of pulmonary diseases, are a unit in ascribing the best possible attainable results to the greater mountain altitudes.

Electrical Conditions of Colorado.—While physicians of intelligence and wide experience in the practice of their profession in Colorado are convinced that, in the realm of electrical influence, a far more potent and beneficial factor exists in the greater altitudes favoring sustenance of the vital powers and recovery in many abnormal conditions than exists in the altitudes nearer sea level, yet they also recognize the fact that our present knowledge regarding this force existing subjectively in individual cases, is not sufficiently advanced to enable us to measure it, fully describe it, or define it with accuracy, and the subject is here mentioned with the hope that the members of this association may interest themselves in further investigation, with the view to the possible removal of the cause, operation, and effect of such important phenomena from the domain of present speculative theory.

A thorough and analytical discussion of the influence of the sun upon our earth and its living organisms would occupy a field too wide for the limits of the present paper. The peculiar power of the solar rays in their creative and hygienic effects upon animal and vegetable life deserves a high place in scientific investigation. Throughout the entire solar system the sun diffuses heat, light, and certain forces yet imperfectly understood, and may, perhaps, be the dynamic generator of the electricity of the world. Heat, light, and that other power, which for convenience we may call electricity, beget something like a chemical agency, the most powerful and

subtle in its creative and metamorphic results within the realm of human observation and science.

The sun may well be regarded, from a purely scientific standpoint, as the source of life, since no material forms of life, either animal or vegetable, could exist without it. Hence, as the creator and preserver of life, no wonder the ancients worshiped the sun—the most natural and rational of all primitive theogony. True, there are certain classes of life, animal and vegetable, which seem to generate and thrive best in the environment of damp and darkness—vegetable forms of fungoid nature, for example, and classes of insects of multitudinous and almost spontaneous breeding faculties, but short-lived, come into being away from sunlight; and with such genera we may class the microbic and parasitic forms of life. But it is remarkable that the sun is the enemy and great destroyer of these lower forms of insectivora, fungi, sporadic and microscopical *malefactors*.

While on one hand, the sun is the greatest germinating agency in Nature, on the other hand it is the great universal antiseptic and germicidal agent in Nature's economy. It is familiar household knowledge that the best way to render wholesome such things as clothing, bedding, carpets, etc., is to hang or spread them out in the sun. How can a poisonous swamp be best redeemed? By draining it and letting the sun consume the malarious and miasmatic elements.

Nothing is so cheap and quickly efficacious an agent, in this regard, as the solvent, deodorizing, disinfecting and vermin-destroying influence of clear sunlight and air—especially *dry* air.

The sun is the great scavenger of the earth. From the earliest travel across the plains and mountains between the Missouri River and the Pacific coast, no fact of common observation was more striking than the rapidity with which carcasses of animals dying alone the route were dried up and dissipated by the sun of the great and arid altitudes, with little or no putrefaction. Indeed, Indians and Mexicans throughout this entire region, from time immemorial, have

cured their fresh meat by cutting it into strips and hanging it up unsalted in the sun, like clothes on a line.

The most primitive peoples of whom we have knowledge in history or tradition were not only familiar with the healing virtues of sunlight, but for this reason, as I have already mentioned, made the sun their chief god. Osiris, the sun, was the god of the cultivated Egyptians, and under various names was the chief deity of other leading Oriental races, as well as the god also of the Montezumas, their pyramid-building prototypes of the American Occident.

And even the Hebrew poets of the Bible were so permeated with the ideas of the so-called "heathen," derived from their former Egyptian masters, that they could not avoid incorporating these ideas into their sacred literature; as witness that beautiful passage of Oriental speech which figures their own God as the "Sun of Righteousness which arises with *healing in his wings.*"

XXV.—DIGESTIVE DISORDERS IN CONSUMPTION WITH MIXED INFECTIONS.

BY PAUL PAQUIN, M. D.,

ASHEVILLE, N. C.

The alimentary canal is to the human machinery what the boiler is to the engine—the internal source of energy for the whole thing. True, the brain and nerve power control it, but the nervous elements themselves can do this only because they receive nutrition through the alimentary canal. Without it they could not carry on their function. So, it is plain, that the nutritive function, after all, is the chief part of the foundation of all forces in a human being, and that without its aid, to a sufficient degree, the repair of damages, whether organic, functional or designated by any other name, is an impossibility.

Consumption is usually a mixed infection. As presented to the special clinician or general practitioner, it is, in the vast majority of cases, a comprehensive exhibition of patho-

gnomonic and pathologic phenomena, immeasurably more complicated than can be realized by either the historic, microscopic, nervous and physical symptoms, or all combined. Indeed, we have in human beings, in our country, at least, no disease capable of permeating so extensively, so overwhelmingly, so persistently and so ruthlessly all of the organs, all of the tissues and overmastering so gravely in one way or many ways, all of the faculties, as consumption. Nor is there another disease of mankind, so irregular in its strange complications, or so appalling in the destruction of individuals and the ruin of the human race. It is estimated that from one-fifth to one-seventh or more of the deaths of the people are due to consumption of the respiratory organs alone. We may safely add a large percentage to this deplorable destruction, as the consequence of tubercular affections of other organs or systems; for instance, tuberculosis of the joints, bones, spinal cord, brain, liver, peritoneum, skin, etc., etc. The total death rate, then, due to diseases of tubercular complications, may be stated as problematical, but as surely predominating above and over any other human affection or affliction in civilization, and possibly more devastating than any zymotic disease in the world. Neither leprosy, with the horror of its name; nor Asiatic cholera, with the terrors of its quick ravages; nor yellow fever, with its spasmodic destruction; nor smallpox with its repellant grossness, has been responsible in equal time for the loss of human life that may be strictly accredited to tuberculosis in one form or another. Indeed, it is doubtful if all these plagues together have sent as many people to the grave as tuberculosis has. In fact it is *the* plague of civilization. Say or think what you will, the truth is, that we are all exposed to it momentarily; that its germs are with us always; that the majority escapes *not because they are not attacked, but because they resist the attacks.* And here is the problem of protection: *A condition that will prevent germs of consumption from developing in the system, and if they do get a start in growth, a condition that will stop them.*

I am quite aware that medical men of reputation, have of

late made capital of the (seemingly new) idea that tuberculosis is not due to germs alone, and, that when we speak of tubercle germs as the cause of consumption, we utter things very vague. Well, this pronouncement is wonderful only to those who have not grasped pathologic and bacteriologic evolution from the beginning. No enlightened pathologist ever thought that the germ of consumption (the bacillus of tuberculosis) could grow irrespective of soil conditions. Such a notion is, and always was to scientific men, as preposterous as it would seem to any mind to believe in the growth of cornstalks from corn seeds planted in a barren, paved street, run over continually by vehicles and street cars.

It is an old story, then, that the bacteria that bring about phthisic lesions are plants that cannot grow without proper nourishment and surroundings. It is for this reason that we do not all succumb to their development. It would seem almost childish to have, in 1902, to revert to this old and simple proposition, so often discussed before and which was settled at the very outset of bacteriology, or at least as far back as I can recall in my medical studies, certainly as far back in the past as 1881; but it appears to be necessary, because, very recently, as I have just suggested, some medical writers have thought, judging from their published statements, that they were bringing forth new points in medicine when they expressed the opinion that tuberculosis could not exist without proper nutritive field. By their learned talks and print they appear to have disturbed those who have not been fortunate enough to follow at the same time the scientific and practical advancement of medicine.

Now, to come to our topic, digestion and indigestion in tuberculosis.

As first indicated, the digestive apparatus is *the* system upon which vital energy chiefly depends. If it does not carry on its functions with sufficient effectiveness and persistency, life is a nightmare, and when sick, recovery is a serious problem. So, with respect to such a disease as consumption (properly named, for it does consume the system in every sense of the word), the most vital question is that of nourish-

ment, whereupon one may base such measures of treatment as may be deemed best for restoration. Without nourishment of a sufficient kind in quantity and quality, nothing will avail in therapeutics. You may have proper climatic conditions; your specifics in the form of serum, or any proper and justified drug; you may add to them the various ordinary and extraordinary measures of daily practice; still you cannot arrest tuberculosis without the assimilation of sufficient and proper food. The alimentary canal must, first and above all, be considered and made effective enough to furnish its quota of the fuel necessary to operate the human machine in all its parts, particularly in its defensive forces, which include more especially cellular regeneration, phogocytosis and the antitoxic powers of the structure and circulation.

Phthisis is considered, usually, very loosely. It means, to most of us, only lung consumption. Who thinks of any other organs as being more or less involved in phthisis? Yet, the pulmonary form is by no means a disease of the lungs alone At certain stages of its development far-reaching pathologic changes occur elsewhere. When breaking down of the lungs begins, for instance, it is *probably never* a disease affecting the respiratory organs exclusively. On the contrary, it *probably always* affects the digestive tube the whole length, at least from the esophagus to the anus, which means practically all of it. And in this statement I do not mean to say simply that in consumption there exists indigestion or dyspepsia; I mean to say that *preceding* consumption, there may exist digestive disturbances of a characteristic kind, which are indicative of *coming tubercular manifestations,* and, that, in certain stages of tuberculosis, there exists almost invariably, if not *always,* some gastro-intestinal lesions of a most serious kind, which very gravely interfere with the efforts made in the line of treatment. Dyspepsia preceding pulmonary tuberculosis was referred to as far back as 1826, by Wilson Philip, in a treatise on digestion. After that it was studied by Todd, who wrote on the subject in 1833. Their opinion, endorsed in 1835 by Sir James Clark, and later more or less

positively by Hutchinson, Brinton and others, was that there exists an unique form of dyspepsia that precedes pulmonary consumption. Saltau Fenwick, as recently as 1894, expressed himself affirmatively on the subject, and mentioned two varieties of anti-tubercle dyspepsia, the atonic and irritable forms.

That a more or less prolonged siege of dyspepsia, involving the stomach or bowels, or all of these organs, is often met with prior to the exhibition of consumption symptoms, is unquestionable, and it is very seldom considered by the practitioner. But, that preceding tuberculosis, it stands as a specific casual relationship is quite doubtful. I rather incline to the belief that such a dyspepsia begins, as a rule, after the tubercular infection has begun, but before it is manifested exteriorily, though sufficient to impress the system internally and reduce the digestive powers more or less. We will consider these two forms of pretubercular (?) dyspepsia further on.

The first things to study in the dyspepsia of tuberculosis are the morbid state and the pathology of the alimentary canal. They constitute a most important question, because they reveal not only functional disturbances, as we are too apt to think, but certain changes that are always more or less rebellious, often irreparable, and which demand generally special therapeutic measures. However, I can only be brief in the treatment of these in this paper.

Dilation of the stomach is one of the common abnormalities of pulmonary consumption. It appears to exist in at at least 50 per cent. of the advanced cases. This organ extends down frequently far below the umbilicus, assuming various shapes according to the distention, sometimes pulling down the pylorus several inches below the normal place.

The capacity of the stomach varies from 8 fluid ounces to 50, according to individuals, but, as Ewald says, there is no standard size and the capacity does not have a fixed relation to the size of the body. Consequently, it is difficult to say when a stomach is distended enough to be classed as morbid. A slightly enlarged stomach in one individual

may be a source of trouble, whereas, in another, a seemingly large dilation may cause no inconvenience. However, the existence of a dilated stomach in tuberculosis, no matter to what degree, should always be taken into account in the work of repair, for the walls of such a stomach and the se-

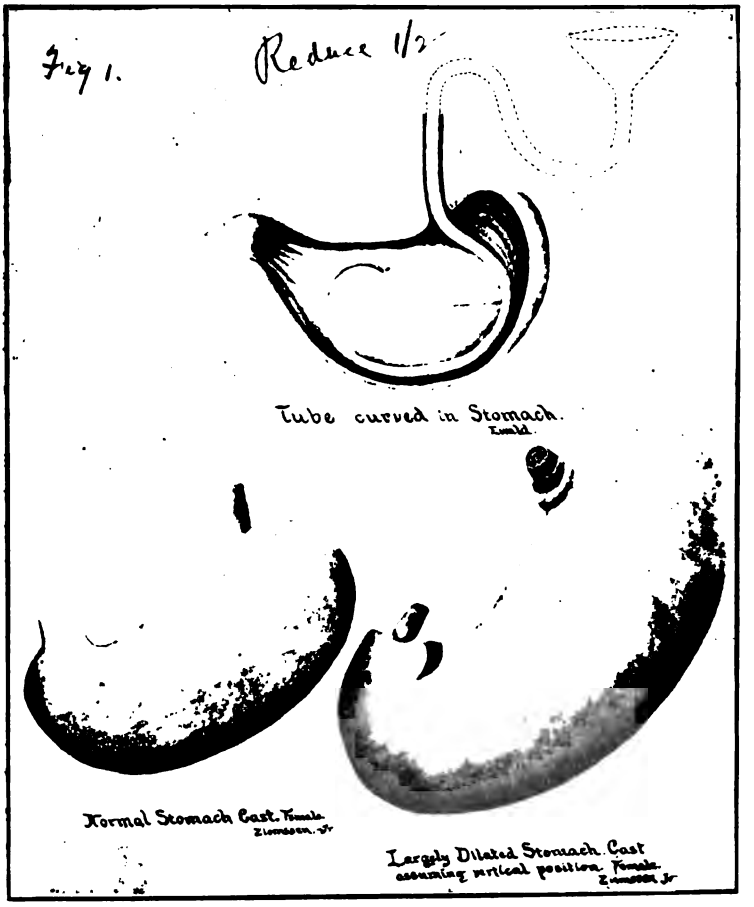


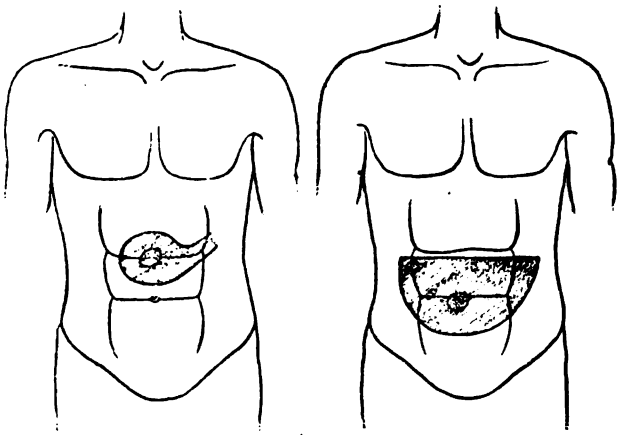
Fig. 1.

cretory structure are more or less diseased. Gross and sometimes microscopic changes exist to some extent.

The muscular layers may be thinned out, atrophied or hypertrophied. The cells of the mucosa may be the victim of cystic or other forms of degeneration and exhibit pathologic signs of gastritis. Such a stomach in tuberculosis is

usually accompanied with catarrhal manifestations. The inflammation becomes chronic and digestion more and more impaired until a patient often thinks that the stomach is the seat of the malady itself, instead of the lungs. How many advanced consumptives exclaim to their physician, "Doctor, it is my stomach that hurts me. My lungs are all right!" and again, "The stuff that I raise comes from my stomach!"

Chronic catarrh of the stomach in consumptives is not limited to cases of dilatation, however—it is more frequent than that. In the last stages of the disease, particularly, it is a common morbidity, due to various causes, among which



Normal Stomach. Dilated Stomach.

Fig. 2.

is the fermentation of food by bacteria. In consumptives who swallow their sputum or nasal secretions, for instance, numerous extraordinary germs reach the stomach, which, in its enfeebled condition, sometimes suffering from alteration in its secretory structure, is incapable of destroying them. I here exhibit a picture made from the chyme taken one morning from the stomach of a consumptive with cavities. In this instance I found even the bacilli of tuberculosis in the organ. The production of a mixture of toxins and irritant substances by fermentation in such a case is easily imagined. A catarrhal condition is inevitable in comprehensive disorders of the kind.

Among other morbid states of the stomach of consumptives at certain stages are "mamillation" by which "the mucous membrane is closely beset with minute elevations;" the honey-combed appearance in which the membrane is pitted in a peculiar fashion; punctiferous hemorrhages; ulceration and hemorrhagic erosions. The latter two lesions are not un common. I many times verified their existence by stomach lavage and microscopic revelations. Those who have had opportunities to study these lesions in the laboratory claim that they are not due to local tubercular infection, although they seem to be the result of tuebrcular disease. Tubercles in the stomach are very rare and of themselves are seldom a source of grave dyspepsia, but they may produce erosions and hemorrhages. The bacilli that reach the organ find there a meagre field for growth, and meet antagonism in the acid; they go down into the bowels, where the lymphoids favor them and whence they may scatter throughout the system. We have, during consumption, gastritis due to different factors, sometimes several combined, and our treatments should be selected accordingly.

If the stomach alone were involved in tubercular dyspepsia, we might succeed more readily than we do in correcting this difficulty, but unfortunately, the morbid state extends generally throughout the intestinal tract, ending its continuity not infrequently with hemorrhoids. We have, therefore, a form of enteritis also in consumptives, at least in certain stages. The organs involved and the extent of pathologic phenomena warrant us to designate the general complex causes of the usual dyspepsia of consumptives as "gastro-enteritis of phthisis," as Fenwick has it. "The essential feature" of pathologic conditions of gastro-enteritis, says Fenwick, "consists of an intestinal inflammation of a chronic type, affecting in a varying degree of severity the whole of the gastro-intestinal tract from the stomach to the rectum, with secondary changes in the glandular structures." I might add to this, that even the buccal cavity and the esophagus sometimes participate in this general abnormality,

for the salivary glands, gums, teeth, tongue, etc., occasionally exhibit peculiar characteristic signs of digestive distress in consumptives. Eventually the stomach tissues may undergo cirrhosis. In the pathologic process of the bowels the duodenum seems to suffer the most, becoming also cirrhotic. The rest of the bowels change more or less in a similar manner.

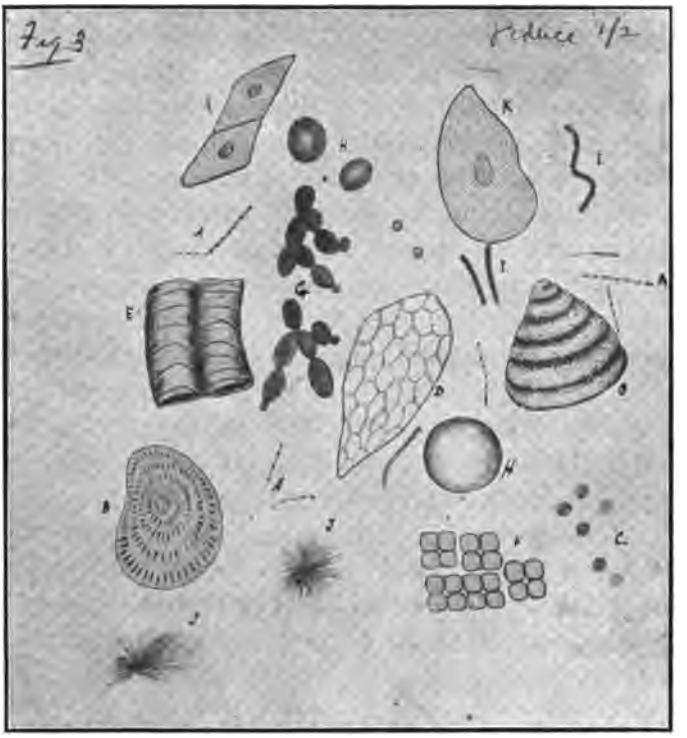


Fig. 3.

Found in stomach contents of a dilated stomach of a consumptive in a case of Ischochymia. Case, A. C. 1896.

A, bacilli of tuberculosis. B, starch. C, cocci. D, vegetable cells. E, muscle fibres. F, sarcina. G, yeast plants. H, fat globules. I, streptococci. J, fat crystals. K, epithelial cells.

It is a grave problem then, that we have to deal with when we have to combat dyspepsia in consumptives. It not only evidences more or less intractable physical and organic changes in the volume and structure of the digestive organs, but implies that the tubercular ravages are *far advanced.*

We have spoken of so-called pretubercular dyspepsia.

This kind of dyspepsia is not the same as that resulting from the morbid states and structural changes just described. The latter comes, in the vast majority of cases, only with the process of lung destruction, such as softening caseation, excavation, etc. This is a very important fact for us to remember, for it is of value in prognosis in pulmonary tuberculosis.

With respect to dyspepsia *preceding* consumption, we may sum up the situation in a few words. As stated at the beginning, I believe it is due to the first disturbances of tubercular evolution before it is manifest outside. If this is the case, it is not pretubercular. I believe, also, that it is usually functional. In any event, it is more easily corrected than the dyspepsia above discussed. Owing to its seeming connection with the development of consumption, it behooves the profession to be on the *qui vive* in every case of persistent dyspepsia in which tuberculosis is not manifest. Such instances should be watched closely, examination of the lungs made at frequent intervals, particularly if there exists cough, no matter how slight, or disturbances of the circulation, such as exhibited by flushing of the face, hot or cold feet, clammy or sweating hands, which are sometimes associated with tuberculosis long before any marked physical symptoms arise.

As stated before, this kind of dyspepsia appears in two forms, the atonic and irritant. The first is more common in females than in males between the ages of 15 and 25, or perhaps 14 or 30. It sometimes begins during the convalescence in some fever or other, such as typhoid fever, measles, diphtheria. The first symptoms of importance may consist of acute pain in the epigastrium after a meal. Vomiting may occur occasionally. A catarrhal condition with loss of appetite and increase of thirst arises, eventually followed by its usual train of digestive distress and disturbances. One common form of disorder very early in this dyspepsia is the abhorrence of patients for fat, particularly beef and mutton fats, not so frequently bacon or ham fat. In some instances, the very odor of meat is repulsive. In atonic dyspepsia of persons born with tubercular taint, the pain at the epigastrium

is very often absent. There is instead a decided feeling of weight and malaise.

The irritant variety attacks men chiefly, from the age of 25 to 40, particularly those slimly built and tall. It also begins with abnormal sensation at the epigastrium. At the start of the disease it is usually a mere uneasiness after meals. Sometimes it occurs only after breakfast. By degrees it becomes worse until it is actual pain. The food ferments, becomes acid, and there occurs sour eructations. Finally such troubles more or less serious occur after every meal; vomiting takes place, exhaustion occurs and the patient becomes depressed and irritable. Appetite gets to be very capricious, being absent one meal or one day and ravenous the next. Sometimes aversion to food previously relished occurs. Usually the tongue is deep red and pointed, occasionally affected with injected papillæ at the end. Not uncommonly, according to Fenwick, and I can substantiate his assurances, there exists frontal and vertical headache, disgusting taste in the mouth and a feeling of extreme weakness. I have seen besides in such cases, a peculiarly profuse general perspiration towards morning, and of the armpits alone under various circumstances not affecting other persons. If one examines the chest of such a patient nothing wrong may be found the first time, but if one persists and examines it often, under different circumstances, some abnormal conditions may be found sooner or later. Suddenly, as a rule—at least it seems sudden to the patient—he complains of a cold in the chest. Then you find congestion of some kind, or infiltration, and soon you have unquestioned evidences of pulmonary tuberculosis.

There is also a variety of dyspepsia which seems to "usher in" or "accompany" the first stages of pulmonary tuberculosis. Notwithstanding the different opinions on this form of indigestion, I am constrained to say, from personal investigation, observation and analyses, that to me it is nothing else than the kind of dyspepsia first discussed, viz., the dyspepsia preceding consumption. The symptoms are simply changed and intensified by virtue of longer disturb-

ances and the complicating factors with the increasing damages of tubercular infection and the consequences upon the nervous system, the circulation the tissues directly responsible for digestion, etc., etc. So, I will not take your time to describe this special dyspepsia, which might be properly termed, the usher-in stage of the dyspepsia preceding pulmonary tuberculosis.

The forms of dyspepsia most important to the physician are those seen *during* the progress of *manifested* consumption, because they are seldom absent when a consumptive comes to a doctor, and need such persistent care when present. In fact, those who treat consumptives scientifically and aim to cure them, know that *none of them can recover,* unless by some *process or other dyspepsia is prevented* or cured. Whatever measures of restoration may be applied to arrest the disease, none can get well without proper assimilation of food, and all treatments that neglect this question are mere placebos, often worse than useless, even sometimes where they prolong a miserable existence.

When destruction of tissue occurs, the dyspeptic phenomena becomes generally very serious. Then it is simply essential to consider them.

It is scarcely necessary to analyze the dyspepsia symptoms accompanying such tubercular conditions. They are practically those enumerated above plus still more increased intensity and complications of food fermentation with autointoxication. All of us have seen these symptoms, and, if we keep in mind the morbid states and pathology briefly scanned at the beginning of this study, we will form satisfactory opinions looking to restoration. Epigastric distress, sour stomach, tympanitis of various parts of the gastrointestinal tract, bile, regurgitation, mucoid, watery and fragmentary stools, diarrhea, dysentery, hemorrhoids, prolapsed stomach, mental depression, etc., etc., are all liable to be present, and fever may be increased materially, and very suddenly, too, by the action of intestinal toxemia, added to the biologic respiratory intoxication.

As already indicated, some authorities in discussing the

various forms of dyspepsia preceding, initiating and accompanying pulmonary tuberculosis, have divided them as if they were each of absolutely separate nature. Of course there is some reason for distinction, but I argue again that all of the varieties have a common cause and some common abnormalities and need differentiation only to the end of deciphering the existing lesions and the application of suitable treatments. In a general sense, consumption dyspepsia is an entity with varied lesions and manifestations.

The therapy of tubercular dyspepsia is as varied as the therapy of other forms of digestive disturbances. I cannot undertake to review it here in detail. The best I can do is to suggest to those interested, that a close study of the authorities on gastro-intestinal diseases and close observation of the gastro-intestinal troubles of their tubercular patients will pay them well, and to advise them of my experience in a general way.

Bearing in mind the pathology of the gastro-intestinal affections accompanying consumption, one will realize how futile it usually is to drug and drug without knowledge of this pathology and its results when trying to cure tubercular dyspepsia. One will reason that the normal condition of the mucosa must be at least in a measure restored before good digestion can recur. What may accomplish this sufficiently for good digestion? It is doubtful if anything can in advanced tuberculosis, but in the beginning or second stage decided improvement and often a cure is possible.

First and foremost among local measures to that end are stomach and high intestinal lavage. As a general rule, nothing restores the power of digestion more positively and more quickly than this practice properly carried on. I have known patients going down, down steadily from the ravages of consumption and consequent dyspepsia, to gain two to four pounds a week after the addition of a weekly or semi-weekly lavage of the stomach alone to their treatment. Some authorities object to this treatment on the ground that hemorrhages may be produced by occasional straining of nausea. This objection

is not well founded. Paradoxical as it may seem, few hemorrhages of the lungs come after exertion or strain. On the contrary, they come usually at night, when the patient is resting, or, in any event, when free from strain of any kind. I have had recourse to gastro-intestinal lavage by the syphon method in consumption for many years, and I have yet to meet with the first accident. Besides, *dexterous* use of the stomach tube is far from being as nauseating as has been claimed. In fact in institutions where the treatment of intestinal diseases is a daily feature, the nurses become trained sufficiently to practive lavage of the whole alimentary tract. This practice obtains, in a good many cases under the supervision of their physicians, at "The Halthenon," at Asheville, N. C., where all approved methods of physical therapy are available. Another general measure of treatment which has proved very useful in my hands is the faradization of the stomach by using Einhorn's intra-stomach electrode, and on the outside of a large flat electrode, say six to twelve inches in diameter. For general atony of the digestive tube, an electrode may be used in the stomach and another in the rectum after an enema. Steady currents and induced currents are also useful in special conditions, which I have not time here to enumerate. As specific measures serotherapy, the cacodylates and iodine seem to offer the greatest aid in preventing organic changes. The properly prepared immunizing anti-tubercle sera are sometimes particularly effective, because they are antagonistic to the tubercle toxins, which are in a large measure responsible for such lesions. As to diet, it must be regulated after more or less complete knowledge of the chemistry of the digestive elements, and their digestive powers which analysis alone can approximate. Of course the physical faculties and conditions of the alimentary canal must be taken into due consideration also.

Often one must resort to artificial foods, such as the peptonates, or plasmon so strongly recommended by the late lamented Virchow, who considered it a superior article in nutritive qualities. I have found it to be quite free from irritating properties, even in very seriously damaged stomachs, and it seems to be as truly nourishing as Virchow stated. An-

other nourishment which I have found as advisable as it has been claimed (by the French) to be, is raw beef juice, made fresh daily. Patients can digest sometimes the juice of one to six pounds per day of beefsteak, and even after that eat their regular meals more or less satisfactorily, according to circumstances.*

Mixed infections in tuberculosis offer the greatest complexity in the dyspepsia that accompany the disease. This is probably due to the more general and serious effect of the combination of the numerous kinds of germ poisons produced in such cases, both in the lungs and alimentary canal.

I now wish to draw your attention to some illustrations I here present to the audience, showing the various damaging germs often found in the sputum of mixed cases, in which the question of digestion is such an important factor. You will see in these pictures that the pneumococcus appears in perhaps all cases of so-called congestion, infiltration, etc., in pulmonary consumption.

I would discuss medical treatment and dietetics at length, but, as suggested before, it would carry me too far, and the authorities already mentioned, whose names I append in the bibliography of this paper, will afford better information than is at my command. My purpose in bringing this meagerly-treated subject before you, is rather to rouse interest in the very important question of digestive affections in tuberculosis than to instruct any one on the points involved. If I have succeeded in a measure in this task, I shall have accomplished some good.

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*Unfortunately beef juice presses that can extract all the juice are wanting. The Hayes Press, Erie, Pa., is perhaps the only one.—P.

XXVI.—THE TREATMENT OF DISEASES, ESPECIALLY TUBERCULOSIS, BY THE ULTRA VIOLET RAYS.

BY A. E. STERNE, A. M., M. D.,
INDIANAPOLIS, IND.

We know that the sun radiates three qualities of rays—the calorific, or heat rays, for the most part lying beyond the red; the *luminous*, or light-giving rays, such as lie between the red and the violet of the spectrum; and the *chemical*, or *actinic* rays, invisible to the eye under ordinary conditions, lacking in heat, but most potent in their chemical, notably their oxidizing property. The actinic rays lie mainly beyond the violet of the spectrum, in what has come to be called the ultra-violet zone, but the violet zone also possesses marked actinic qualities. Of the rays perceptible to the eye as seen in the prismatic spectrum the red are the hottest, the orange next hottest, and so on, till we reach the violet which, while they are coldest, still emit the greatest light on account of their shorter wave-length. All of the luminous rays—that is, those we can see—differ in wave-length only. It is this difference in wave-length that induces the difference in color. When wave-lengths become either too long—as in the ultra-red zone—or too short—as in the ultra-violet zone—they become invisible to the human eye, though not to human consciousness and human utilization.

When rays of light, whether from the sun, or any other luminous substance, strike an object, they do one of three things, alone or in conjunction, namely:

1. They are reflected or turned aside,
2. Transmitted or passed on, and
3. Absorbed or utilized by the object itself.

Probably every object does all three to a certain extent, but we have here to deal only with the last mentioned factor, the *absorption* of light. Objects differ widely in their co-efficient of light absorption, but probably every object absorbs light-rays to a greater or less degree. Notably is this true of the violet and ultra-violet rays, whose characteristic is chiefly chemical or actinic. It is this actinic force that we are hence-

forth to consider, and mainly in its relation to tissues. In other words, its action in maintaining health, in the prevention of diseases and in their treatment.

I believe I have elaborated a method of great practical value, thoroughly scientific in its principles and eminently qualified to produce excellent therapeutic results, directly corresponding to those which are naturally taking place around us, through the action of sunlight, and in every respect verifying upon living beings suffering from various diseases, the experiments demonstrated in our bacteriological and hygienic laboratories.

To begin with the simplest method, the action of pure sunlight. We know, and have for ages known, that where the beams of the sun are shed disease is practically never encountered. From remotest periods to the present day it has been recorded that the most salubrious locations were those flooded with sunshine, and equally, as a matter of record, that where sunshine never falls we are certain to find disease. Sunshine purifies everything it touches, disinfects every object it penetrates, and retards, or destroys, every known form of germ life, even when these germs are of the most virulent type and in the most favorable culture media.[1]

The more the sun's rays are absorbed and the longer the exposure to the action of the rays, the greater will be, and is, the effect attained. But it must not be supposed that this effect is due to the heat of the solar beams. While it is always inseparable from this quality, it is almost purely the actinic action to which is ascribable this beneficial influence. That this is true can be definitely and readily demonstrated by anyone with a large prism exposed to the sun, and with an ordinary culture tube containing almost any germ in virulent stage. It will be found that all forms of light rays have a beneficial action, but that this becomes markedly greater as we proceed in the exposure successively from the red, the hottest, to the violet, the coldest zones of the spectrum. It is, therefore, not a thermic, but a chemical, an actinic action we encounter. It follows, then, as a matter of course, that the nearer the surface the diseased tissue lies, the more readily the actinic force will become applied.

The simplest form of application is the direct sunbath, where the nude body is exposed to the sunlight. Simple as this method is, it is woefully neglected. Moreover, it is effective in almost all conditions of debility, notably after wasting diseases like typhoid. The younger the individual, and the more absorptive the skin, the better the result will be. The ordinary window plate, too, accentuates the action of the sun, inasmuch as the glass to a slight degree takes the place of a concentrating lens. The sun-rays become directly absorbed by the tissues, the blood corpuscles coursing in the vessels beneath the epidermis, and deeper, are bathed in sunlight. The chemical action of the light unfolds itself to the extent of increasing the oxygen-carrying property of the haemaglobin, and even to the augmentation of the corpuscles themselves, both red and white. Herein, we have a distinctly actinic force, the primeval actinic method available to any person, free, God-given wherever the sun may shine. Just here, however, lies the difficulty.

The sun is so frequently obscured by clouds or mists that this effect is lost to a vast degree, and we are forced to seek either a locality where atmospheric conditions are favorable, or create an artificially favorable atmosphere, one where there is ample light, akin to sunshine, and best, associated with the purest of air containing large quantities of ozone, free or nascent. These two, light and ozone, are absolutely inimical to disease, to germ life in any form. They are found, as is well known, far above the sea level—on mountain top. Unfortunately every invalid cannot seek such localities, and besides the factor of altitude plays an unfortunate role. *It changes the breathing basis.* If this change in the breathing basis is maintained long enough, individuals living must continue to dwell under similar conditions. If they pass to low altitudes, a quick relapse is apt to occur. For this reason I have been led to seek to create an atmosphere similar to that of the mountain top—rich in light and ozone, but *without* altitude. I have believed that this could be attained and have steadfastly worked toward that end, assured that, if successful, it would accomplish both extreme oxidation and

germicidal effect, thereby covering a vast field of disease from the extreme alkaline or strumous-tuberculosis, to the extreme acid or rheumatoid-lithaemic. And I have good reason to believe both have been accomplished, not only as to method, but also as to results.

Ere describing this method and its uses, it will be necessary to elucidate the course of reasoning traversed toward its attainment, from its inception through a study of the sun's rays and their influence, to its present state of development. Sunlight produces kinetic and potential energy in the vegetable, the mineral and the animal kingdoms, all of which bear a sort of interchangeable chemical relationship to each other. The energy of the sunlight and heat is a force at least akin to, if not identical with, electricity in some or all of its forms. In fact, many scientists believe, upon very valid grounds, that electric phenomena are the direct expression of the chiefest force in nature, the transplantation rather than the transformation of the solar energy itself. At least it is a known fact that we can accomplish, with electricity of exceeding high potential, almost every phenomenon attainable by the sunlight, when the rays are concentrated sufficiently, high or low. First of all, we can create through electricity a luminous or incandescent condition, vastly less in degree, but exactly akin to that of the sun itself. Moreover, a body so rendered luminous or incandescent acts upon other bodies in a manner exactly parallel to the action of the sun. Furthermore, experiment, research and practice have demonstrated the perfect feasibility of the conveyance of potential energy to substances or bodies, living or dead, by electricity in a ratio approximating that of the solar planet. Almost every physical or chemical property of the sun and its forces has been reproduced in miniature by electric currents in some form. Even the storage of potential energy in plants and animals, or parts of these, has been accomplished in a manner truly analogous to that exercised by the sun itself. Just as vegetable and plant life unfolds itself and grows to the full in the light of the sun, so it can be made to unfold and grow in the light created by the voltaic arc.

From this basis a method of treatment has been deduced. It is perfectly practical, absolutely safe, and if I may judge of the results attained during the five years of most careful use and development(of the method) of much and great importance. It is to this method that I particularly desire to call attention. Some of you know, and a few of you may have witnessed, the work of Prof. Finsen of Copenhagen, an actinic-ray treatment of certain dermatological lesions, like lupus, first by means of the sun's rays through concentrating lenses, and later through powerful electric arc lamps and lenses. So far as is known to me, Finsen and his followers have directed their efforts only toward skin affections, mainly lupus, it is said with excellent results, but at least with no more, and probably with less effect than by the X-ray method. Others, among whom may be mentioned Mount Bleyer of New York, have attempted to cure constitutional maladies, like pulmonary phthisis, along much the same lines, or with static machines of great power and electrodes saturated with formaldehyde solutions placed upon the chest or other affected part. Others again have employed electric light baths, using ordinary incandescent globe-lamps, which are perfectly worthless.

Doubtless some of you recollect that a few years ago violet panes of glass were used with this same end in view. None of these methods has, I believe, given satisfactory results, mainly because they were not practically applicable, but the underlying principle of actinic action was quite correct, and these failures but serve to show that for many years there have been made efforts to secure some actinic method of worth. This method, I believe, I have elaborated to a point where not only general, but also local actinism associated with nascent ozone, is possible. By this means it seems to me an artificially created atmosphere akin to that of the mountain top, but richer even than this in actinic qualities and ozone, and *without* the *deleterious effect* of *altitude,* has been attained. This, and the use of specially constructed vacuum conductors, without any terminals whatever, to be attached only to one pole of extremely

powerful amplifying, high-tension electrical apparatus for local application, are only the claims of uniqueness I make, so far as means and method are concerned. The claims as regards therapeutic results form another and distinct chapter.

The apparatus used is as follows: Picture to yourselves a large cabinet into which the nude body is placed in sitting posture. Behind and in front of the body projecting within the cabinet are powerful specially wound arc lamps, the durability of which is sacrificed to their efficiency. Upon this cabinet and separated from it, is a sliding dome to contain the heat of the patient. In this dome is placed a diffuse ozonating arc of peculiar construction. This latter is connected with a compound combination amplifying apparatus in one end of the cabinet, distinct from the space occupied by the body. From the amplificator certain wires run to poles, to which the conductors for local use are attached. These conductors may be called electrodes with non-conducting exterior and a conducting interior, without terminal wires or plates. Such is the apparatus without entering into details of construction. When in use, the body of the patient is flooded with extremely rich actinic light. The body being nude, the penetrative rays not only bombard the surface, but pass through the epiderm to enter the blood corpuscles coursing beneath. That they do this would certainly seem indicated by the increase in per cent. of hæmoglobin and the quick augmentation of the corpuscular elements. Under treatment there is usually profuse perspiration, but the body temperature has never been found raised beyond one-half degree, so that the effect is not a thermal one, but due to stimulation of the nerve-endings.

The head of the patient is protected from the intense light to which the nude body is subjected, partly in order to insure the safety of the eyesight. The air breathed is enormously charged with free ozone, or, if desired, with formalozone or eucalyptozone, or with a combination which experience has shown particularly efficacious. Attention is drawn to the fact that these elements are in gaseous form and can therefore enter wherever air can pene-

trate. I have always regarded vapor inhalation as deficient, because no vapor-laden air can enter the deeper-lying diseased lung tissues. This only gaseous substances can do. Whenever a local application is made, a very remarkable phenomenon is shown. Not only does the conductive interior become luminous, but ozone in its most powerful tri-atonic form is driven into the tissues and remains in situ in nascent form to liberate free oxygen at any point toward which it is directed. This I have repeatedly demonstrated in living animal tissue. The conductors are constructed in diverse forms to suit the anatomical regions for which they are employed. Thus we have those for surface application, for the vagina, for the nasal cavity, for the larynx, etc. This is in short the method of usage.

Now as to the affection treated and the results thus far attained. At first I was in search merely of an actinic action to assist in the restoration of lost nerve energy in cases of neurasthenia and debility, such as come so frequently into my care at the sanatorium. Experience, however, demonstrated that the method had a vastly greater range of application than I had counted upon, for complicating or casual affections were either improved or cured. For this reason, I began to experiment with chosen cases of various diseased conditions, such as pulmonary tuberculosis, diabetes, syphilis, rheumatoid affections, as well as distinctly organic nervous affections and the many localized conditions so often encountered in neurotic subjects, notably acute and sub-acute pelvic inflammations and exudates. Certain skin affections. like eczema and psoriasis were also treated. It would require too much time to enter into all the details at this time, but I promise to present further communications upon this subject. I shall content myself with a brief recital of the general results attained. During the five years in which I have employed this method a large number of cases have been treated, with an aggregate of several thousand treatments. There have been failures to record in some instances, but in the main this method has given excellent and some remarkable results. Several cases of pelvic inflammations and exudates have been

completely cured, some only partially benefited. Many patients suffering from catarrhal nasal and bronchial affections have been either entirely relieved or much ameliorated. In hay fever and asthma the results have been espcially good, both under complete and local application. Several extremely severe instances of these affections have been cured, or at least the attacks overcome without sending the afflicted individuals away from home. Two cases of wide-spread psoriasis of years' standing were very rapidly, and seemingly completely, relieved. In the treatment of locomotor ataxia and other constitutional nervous diseases, the results have been far more satisfactory than by any other method I have ever employed, and I think I have used almost every method of any worth whatever.

In all stages of uric-acid and rheumatoid maladies I fully expected distinct reaction to this method, for it is essentially one of oxidation. The profuse perspiration which nearly always accompanies the actinic treatment is naturally of the greatest value whenever faulty metabolism exists, and when this is directly influenced by oxidation of the deposits and consequent solubility of substances known to act deleteriously upon the system by their toxic character, it could fairly be surmised that distinct benefit to the patient would result from their elimination. Experience has shown that my expectations were completely realized. Several severe cases, associated with marked nervous symptoms, were entirely relieved, while the milder forms recovered with comparative rapidity. It must be remembered that we deal in such conditions with an actual loss of oxygen in the molecular composition of uric acid, $C_5 H_4 N_4 O_3$. By restoring the oxygen in nascent form solubility is recovered.

But it has been in neurasthenia and other debilitated conditions, and in essentially tuberculous affections of the lungs, that the actinic method has achieved the best results, and these have been almost uniformly excellent. Not a single failure in neurasthenia, however severe, nor in exhausted conditions with or without anemia, has developed.

The most gratifying results have been attained by this

method in pulmonary tuberculosis. I am fully aware that in making this assertion I am treading upon ground which has been for years worked upon and in which some glowing medical failures have been a matter of record. Nevertheless I am prepared to assert positively, and I hope eventually to prove by future results, the following:

That in all cases of lung tuberculosis where the disease has not advanced too far, complete cure will result from the proper methodical use of the actinic method. The cases heretofore treated, while not a few in number, may still be considered insufficient to bear out my claims in the minds of the profession at large, for we are all naturally skeptical whenever a new cure, however positively stated, and no matter how reliable the source, is called to our attention. To my mind, however, a dozen cases carefully followed out, both clinically and pathologically, with careful blood and sputum examinations at frequent intervals during the course of treatment, are as reassuring as a hundred, where the results gained are so eminently complete.

In the cases of phthisis heretofore treated these results have been as follows:

In every incipient case and in every case where the process had not passed beyond what is commonly termed the first stage, there has not been a single failure to record. Almost from the commencement of treatment a noticeable improvement showed itself. Expectoration and cough—which at first may be augmented for a time—decreased, appetite and weight increased in spite of often profuse sweating during the ten to twenty minutes of body exposure, and gradually the physical weakness disappeared. In from ten days to three weeks the blood examinations revealed a notable increase in the number of red and white corpuscles, sometimes multiplied several times. The per cent. of hæmogoblin increased markedly. The sputum grows thinner and more profuse at the start but gradually decreases in volume, with a corresponding decrease in the number and final disappearance of tubercle bacilli and other micro-organisms of mixed infection. It is to the septic influence of the latter

that so many of the associated clinical symptoms of consumption are due. In fact, I wish here to record the decided opinion that tuberculosis affections, *per se,* are not nearly so dangerous or so fatal as the profession believes, nor is pure tuberculosis a febrile disease. It is only where there is mixed infection with the germs of ordinary sepsis that fever obtains, that rapid advance in the malignant process occurs, and usually here only that we meet with a fatal end. Unfortunately, this mixture of infection usually takes place. It is in overcoming the complicating septic condition that gives this method its greatest value and permits the restoration of the wasted energy to these patients. It is unnecessary to further speak of the immense advantage thus gained toward the extinguishing of the tuberculous process itself. Patients suffering from more advanced stages of tuberculosis were much benefited, and some seemed on the verge of recovery, but continued to manifest distinctly characteristic symptoms.

I have tried this method of treatment in cases of far advanced phthisis with cavity formation. Only the complicating symptoms were relieved, especially when formoeucalyptozone was used. Cases with strong tendency toward hemorrhage are probably unfit for this method of treatment, though no bleeding of magnitude has occurred under my observation. I have been careful to select the cases, and have not allowed anyone I considered a dangerous subject to be treated. However, I have shunned no case of pulmonary tuberculosis which I felt might be cured by a long sojourn in Colorado or elsewhere, and in several instances I have taken cases into treatment which I should not have risked sending into high altitudes. It is to the absence of altitude that this method owes its absolute safety. Everything else that the condition of the Colorado mountain atmosphere gives seems to be abundantly supplied by the actinic rays of light and the free ozone.

In addition to the general treatment as previously described, local applications upon the chest over the affected areas in the lungs were invariably given with a view toward

sending ozone, in nascent form, directly into the diseased tissues by means of the glass electrodes. Nascent ozone is an extremely active germicide and, in addition, liberates free oxygen in situ. Doubt will probably be expressed as to anyone's ability to send nascent ozone into any part of the deeper tissues on the ground that electric currents diffuse themselves along the paths of least resistance beneath the skin. This is quite true for ordinary currents, and to a lesser degree of this method also. The currents used are, however, of such high potentiality, and as the actinic rays travel along approximately straight lines after deliverance, the usual rule does not apply here. Experimentally I have sent ozone into animal tissues, and found its presence there by chemical reaction. It is a common comment of patients thus treated, that they can taste the peculiar effect of the ozone in the expectoration long after the external application has been made. Nor does the effect of this treatment seem evanescent or lacking in ultimate permanency, for those patients who had recovered showed no marked tendency to relapse, even where they were not as cautious as they should have been.

Some of you may very reasonably ask why I do not give full statistics of all cases treated during these years. My reasons for not giving more detailed statements regarding them are twofold—first, too much time would be consumed thereby; and second, they would be questioned no matter how complete they might be. I rely entirely upon the results gained after this public announcement of method and treatment is made. Everything savoring of newness and importance in the medical world is with perfect justice regarded with skepticism by our profession at large, in part, because the enthusiasm of investigators and observers so frequently carries them too far. I have tried to be as conservative and moderate as I feel the importance of the subject and the results heretofore gained would warrant. As remarked before, what the actinic method as here described accomplishes after this perfectly frank statement of its worth,

as I and others regard it, must be the sole criterion of its value and utility.

To summarize what has been brought forward here today ere I conclude:

1. Actinic rays are chemical in their quality, but of small caloric value.

2. They exist mainly in the ultra-violet zone of the spectrum.

3. Actinic rays derived from high power electric light are similar or identical to those of solar origin.

4. Their use is as rational as that of sunlight itself.

5. Their value lies in their decomposing, but at the same time reconstructive, molecular action upon the body tissues, mainly the blood elements.

6. By the method herein spoken of their activity is enhanced by the generation of ozone in free and nascent form.

7. Their ultimate effect is one of oxidation, and consequently they increase the metabolic changes, thereby augmenting the natural processes of regeneration within the system.

8. The germicidal action is especially pronounced on account of the fact that few germs can exist in the presence of free or nascent oxygen in either bi or tri-atomatic form.

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DISCUSSION.

Discussion on the papers of Drs. Campbell, MacNeill, Paquin, Sterne, Babcock, and Holmes.

DR. C. L. MINOR, of Asheville, N. C.—There is very little left for one to say with regard to the home treatment of tuberculosis, for the reason that Dr. Babcock has covered the ground so well. There are one or two points, however, that I might refer to in connection with the other papers. Dr. Paquin referred to dilatation which exists in connection with these cases of tuberculosis. In my opinion, this dilatation is so common that no lung examination is complete without an examination of the stomach.

I desire to take issue with my friend, Dr. Sterne, as to the afebrile nature of pure tuberculosis. If he means by an afebrile temperature one that does not rise to 101 degrees, I might agree with him, but any man who keeps long and systematic records of temperature in tuberculosis will find that slight temperatures are so common that there is no better diagnostic measure in incipient tuberculosis. In the early stages the temperature will generally run to 99.2 degrees or 99.8 degrees. I call that a temperature, and this temperature will occur long before any softening occurs, or perhaps other changes, or any evidence of the action of the streptococcus.

As regards Dr. Holmes's tent, I do not wish to be understood as criticizing it, because it is admirable in many ways. I do not believe, however, that the tent will in the future replace other well-known shelters, namely porticos, owing to the difficulty of ventilating them freely enough. Unquestionably, for sanatoria, the coming method will be the erection of cottages built in the grounds, with plenty of windows, which tents have not, and with the most modern or up-to-date ventilating schemes. It seems to me, sunlight does not get sufficiently directly into a tent like this. Although there are many admirable features in it, that feature of itself would make it imperfect. If Dr. Holmes wishes to make the experiment, I would suggest that he fill the tent full of smoke, and see how long it would take the smoke to change on an unwindy day. That is the best way to test the air change in cubic spaces. My impression is that the absence of windows and the smallness of the door, despite the openings, would make an objection to the tent, and that a well-arranged room with at least three windows, a fireplace and a sunny exposure would make a more airy sleeping place than it.

Dr. C. B. Taylor, of Carthage, Mo.—I wish to say a word or two, in the first place, in reply to the remarks of the gentleman on my left about examining the stomach in these cases, as well as the lungs. I do not believe a stomach examination throws any light on the diagnosis of tuberculosis. I have made some tests myself. I have a record of eight cases in which I examined for free hydrochloric acid. I found that three of them had the normal, and two or three had an excess of free hydrochloroic acid, and all of them I believe had free hydrochloric acid. I examined also for dilatation of the stomach. I believe dilatation may be brought about

in some cases by stagnation of the food. I think the tubercular product, where there is an ulceration of the stomach, prevents digestion, and dilatation follows as a result.

The papers have been very instructive, and many points have been brought out that are worth remembering. Of course, it has been very generally brought out in the papers that if we have tuberculosis, we should go West and be cured. I recall a number of cases that I have sent West, and I do not recall to my mind a cure in any one of them.

DR. BABCOCK.—At what stage did you send them?

DR. TAYLOR.—The second stage. It is very hard to persuade them to go during the first stage.

DR. SILVIO VON RUCK, of Asheville, N. C.—In regard to Dr. Paquin's experience that dilatation of the stomach occurs in some 50 per cent. of cases of pulmonary tuberculosis, I may say that this condition has by no means been so frequently noted in the Winyah Sanitarium. Since the maintenance of good digestion and assimilation is of paramount importance for the accomplishment of favorable results in all cases of tuberculosis, we have always taken carefully into consideration the condition of the digestive organs in our cases. Our observations in this respect have not justified the conclusion that dilatation of the stomach is of more usual occurrence in tuberculous patients than in other individuals, except in far advanced cases.

Dr. Campbell has well indicated the class of patients which should be sent to Colorado. It seems to me that his remarks apply equally well to the sending of patients to any other resort. Those patients whose condition appears hopeless or doubtful as to obtaining real benefit, because of such conditions as Dr. Campbell has mentioned, should not be sent away at all, unless by means of proper management and treatment at home, they show improvement. If the latter becomes apparent at home, then resort to climatic stations may be considered advantageous. Another class of patients who should not be sent away consists of those, who, in spite of the free drinking of hot water and the use of mild diuretics, show a persistent diazo reaction of the urine.

I see no objection to tent life, especially if well constructed tents, such as Dr. Holmes has shown us, are employed, but as concerns fresh air, I fail to appreciate the advantage of a tent over a properly ventilated room, for since it is generally recognized that the essential feature of climatic treatment is the effect of sunlight upon tissue metabolism, we can secure this influence equally well whether the patient sleeps in a tent or not.

As a result of climatic treatment arrestment and latency of the disease undoubtedly often obtains, but these patients are not truly cured, for if they be tested with tuberculin they will show reactions almost uniformly, which indicate that the tuberculous affection still exists, although it has ceased to be active for the time.

DR. H. J. STEWART, of Chicago.—I would like to ask Dr. Babcock in what way he is enabled to have these patients eat as many as twelve and fifteen raw eggs a day?

DR. BABCOCK.—It is done largely by moral suasion, Doctor.

DR. CAMPBELL (closing the discussion on his part).—I do not believe I can add anything to what I have said in my paper. To the gentleman from Carthage (Dr. Taylor), I would simply impress upon him the necessity of sending his patients to Colorado in the first stage of the disease, and not the second or softening stage. If I can impress you with the importance of sending your cases to Colorado in the early stages, much will have been accomplished; we will keep them with us and make useful citizens of them, or send them back to their homes cured. If you send them in the second and third stages of the disease fewer of them will improve and many more of them will die.

In answer to the remark that was made by a member as to the results obtained in his patients by sending them West, I will repeat the appeal that has been sounded from all Eastern sanitariums, "Send us your cases early; let us select our cases, and we will give you good results." Follow this plan in sending your cases West and we will excel the results obtained in the Eastern sanitariums. We can not refuse your patients, neither do we intend advising against sending your advanced cases and giving them the only remaining chance to live, but we must tell you what the results will be if you keep your patients at home until their lungs are breaking down. The proportion of benefited and cured will be less as the stage of the disease advances.

Just a word or two with reference to Dr. Holmes's test. It has many excellent features. I would like to ask him one question, if we have impure air upon the floor of our homes, and all rooms heated and occupied, why does he not ventilate his tent in some way from the bottom, instead of throwing in air five feet above the floor? We, who have gone into tents heated and occupied as living rooms, will have to admit that there is impure air in them. Unless there be free ven-

tilation provided for, the meshes in the tent material will not ventilate sufficiently. How can we get the bad air off of the floor with this tent.

DR. PAQUIN (closing the discussion on his part).—I do not wish to be understood as advocating any stomach treatment exclusively to cure consumption, yet I appreciate the fact that we do not have one case out of fifty of tuberculosis that does not exhibit some form of dyspepsia, and we must take care of this grave trouble. The lesions of tubercular dyspepsia have been well demonstrated pathologically, both in the dead-house and in the laboratory. The percentage I have mentioned was taken from Fenwick and I think Richardson. A consumptive with persistent dyspepsia will die. The question of over amount of hydrochloric acid in the stomach has no special reference to tuberculosis. What I wish to call attention to particularly are the frequency of dyspepsia in consumption and the forms of mixed infection we have in which such dyspepsia plays a serious part. (Here the author showed beautifully illustrated charts of his own from actual cases, the bacillus tuberculosis, pus cells, and staphylococci being present. He also showed some beautiful pictures taken from microscopic slides of staphylococci, pus cells, and tubercle bacilli mixed.) Here (indicating) we have a case of mixed infection in which pneumococci and tubercle bacilli are present. This is what I want to call attention to particularly, because with the pneumococci in connection with pulmonary tuberculosis, where we have congestion of an acute character, we have the highest fevers of mixed infection. We have pneumococci existing along with tubercle bacilli, pus cells, epithelial cells, etc. Here is the case of a man (referring to illustration), in which there were pneumococci and tubercle bacilli; and here is another case of the bacillus of Friedlander, in which we have the bacillus tuberculosis and pus cells. Here is a drawing from a case of asthma, in which we found the bacillus tuberculosis, pus cells, and pneumococci. We have a great many cases of mixed infection, and high fevers are produced, not only by streptococci, but by a mixture of germs and their toxins and their effects in a general way. Pneumococci are present very frequently in cases of tuberculosis.

I wish to say a word or two in regard to forced feeding in cases of advanced tuberculosis associated with dyspepsia. In many instances I find it wholly impracticable to resort to forced feeding with solid foods or milk unless I use moving

stomach lavage in the proper way, sometimes intestinal lavage, by which you remove some of the debris, and thereby stimulate the secretion of gastric intestinal force, and stimulate peristalsis. Forced feeding with raw beef juice, made fresh, is not only possible, but often advisable and useful. (The author also exhibited pictures of gross lesions of pulmonary consumption and dilated stomachs of consumptives.)

Dr. Sterne (closing the discussion on his part).—I should like to add to what I have already said these remarks: There is no method comparable, taken altogether, to that of sending patients to climates appropriate to their condition, if we can send them. But of the immense multitude of people who are suffering from tuberculosis and tuberculous conditions, only a very small per cent. can be sent to such places or climates, where the atmospheric and climatic conditions are favorable. What shall we do with the immense number of patients who cannot afford to go there, unless the states send them there? I know of hundreds of patients who have lived in Colorado for a considerable period of time, who find it very difficult to live there. They have not the means or circumstances to get along there, and, furthermore, they go there at a comparatively early stage of the disease. I believe, when properly treated, these patients get well in Colorado, and I believe they can be treated at home without going to Colorado or any other place. If a patient can afford to go to Colorado, it does not make any difference to him, and all such patients will go away. I feel that many, many of the cases, if properly treated at home, could be benefited very materially, and some of them cured.

Dr. Babcock has brought to our minds a simple method of simulating the conditions which we find in climates like Colorado, without the high altitude, and by which hundreds of patients might be benefited who cannot seek these regions. Climates like Colorado are undoubtedly superior to our climates, but, as I have said before, altitude is certainly a deleterious feature, provided these patients do not intend to live there the rest of their lives.

Dr. Babcock (closing the discussion on his paper).—Dr. Taylor has said that he is one of those who urges tuberculous patients to go West; others advocate the treatment of these patients at home, and Dr. Sterne has asked the question, "What shall we do with those patients that have not the means to go to such places as Colorado or New Mexico?" Treat them according to modern sanitary methods at home.

My position is this: In climates such as Colorado, Asheville and others, the modern sanitarium treatment or methods can be carried out a great deal more easily than they can be at home. When a patient consults me who has tuberculosis, who can afford to go to Colorado or elsewhere, I send him. I send the patient always to a physician whose methods I can rely on, and I impress upon the patient the fact that he must absolutely place himself under the supervision of the man who knows what is to be done, and that he will do it, and that he does not do what is to his injury. Patients who cannot go away from home and avail themselves of climatic influences, I try to treat by the methods I have advocated, and although in Chicago the air is full of dust and smoke, nevertheless, I have gotten some gratifying results in carrying out this line of treatment among people of moderate means. The air of our cities outside of the buildings is not pure, but it is infinitely better than the air inside the buildings, or inside the residences of those patients.

I believe in tent life, if the tent can be properly ventilated. I urge, you, when any of you are carrying out the modern sanitarium treatment of tuberculosis at home, and are compelled to fall back on a tent in the yard, to construct one that can be ventilated. A tent which is shut up is nothing but a canvas room, and it is just as bad as any other room.

With reference to the question asked by Dr. Stewart, as to how to get these patients to take so many raw eggs a day, it is largely moral suasion. It is largely a question of suggestion. Over and over again, I run across cranky patients who insist that they cannot take raw eggs, because they are disgusting; that they cannot swallow a raw egg. I tell them that they can. No person can tell me that he cannot swallow an egg if he makes up his mind to do so. I instruct these patients to drop an egg into a wineglass and sprinkle on it some salt, lemon juice, or a little wine. Taken in preference, in that order, they will swallow it as they would a raw oyster. They should not stop and look at it. I have had delicate patients who told me that they could not swallow a raw egg, and yet, after a little instruction, they would take three or four eggs in a glass every meal, in addition to three or four quarts of milk a day, and *that* in addition to three hearty meals. When they have done this, I have known them to gain two pounds a week. These patients must be subjected to a rigid regime. Your will must dominate their wills.

Dr. Holmes (closing the discussion).—I wish briefly to reply to the points raised in reference to the "tent-cottage" I have exhibited.

In the first place, the tent-cottage is not intended as a substitute for outdoor life. It is intended chiefly as a sleeping apartment, but it can readily be made comfortable for a living room during the day. It can be adjusted for any kind of weather and for any season of the year.

The criticism has been made that the sunlight cannot reach the interior of such a tent-cottage. I wish to state in reply that this is one of the strongest points we make in its favor. It is shown in the model and from the mechanism described, that sunlight may enter the interior through each side and through each end. There are windows in either side, the rear end, and the upper half of the door.

Furthermore, the mechanism for raising the upper half of the outer wall, and lowering the upper half of the inner wall, enables us to convert the "tent-cottage" into a "tent-pavilion," which will furnish any degree of open air exposure that may be desired.

On the other hand, I may say that by means of the "eave ventilation," the "roof windows" and the windows on either side, the rear end and the upper half of the door, the "tent-cottage" may be ventilated to any extent desired by the patient. These are especially planned for cold weather. In warm weather the tent-cottage is converted into a tent-pavilion and the patient, while protected, has the advantage of on out door life day and night.

I have made a practical test of the utility of the tent-cottage I present. The heat and ventilation can be delicately adjusted. It has been used by patients accustomed to the luxuries of life, and they invariably prefer it to any room indoors. They claim for it a freshness and purity of the air that cannot be secured in any building.

I claim for it, therefore, that it is perfectly feasible in any climate, and that it can be adopted by sanatoria or even in the home treatment of tuberculosis.

XXVII.—SPINAL CONCUSSION, SO-CALLED.

BY CARL E. BLACK, M. D.,

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While the subject stated is "Spinal Injuries" it is really intended to confine the discussion to cases of so-called "concussion of the spine."

This paper is a continuation of the subject as presented to the Illinois State Medical Society, at its last meeting, at which time the histories, causes, pathology, and treatment of five hundred and fifty-five cases of concussion, sprain, fracture, dislocation, gunshot, and stab injuries of the spine taken from recent literature were considered with especial effort to discover the true value of operative treatment of such cases.

In going over the literature I was struck with the great number of cases which remained unclassified, and which were for the most part grouped under the term "concussion of the spine." This unclassified group seemed to contain every kind of spinal injury in which a positive diagnosis of fracture or dislocation could not be made.

Probably no question in surgery is subject to such diversified opinion as spinal concussion, so-called. How a subject of such far-reaching importance to general practitioner, surgeon, and neurologist has so long remained unclassified is difficult to understand. No injury which the surgeon meets affords more perplexing and embarrassing situations than these. Few injuries, especially in railway surgery, give more serious and annoying medico-legal complications.

Should the railway surgeon make a diagnosis of "concussion of the spine," and attempt to define the condition by quoting authors on the witness stand, it is altogether probable that the opposition could produce quite as many and competent authors as he, no matter what position he took.

It was with a desire to find some solution of the present chaotic condition of the naming and description of this class of injuries that the present study was undertaken.

Definition.—Let us consider briefly the definition of concussion. Webster says concussion is "A condition of lowered

functional activity without visible structural change, produced in an organ by a shock, as by a fall or blow."

The Century Dictionary defines concussion as "The act of shaking or agitating, particularly by the stroke or impact of another body.

"2. The state of being shaken; the shock occasioned by two bodies coming suddenly and violently into collision; shock; agitation.

"3. In surgery, injury sustained by the brain or other viscera, as from a fall, a blow, etc."

The Standard Dictionary defines concussion as "The act of shaking violently, as by a sudden blow, or the state or result of being so shaken; shock; agitation; especially in surgery, a violent shock in some organ by a fall or a sudden blow; as the concussion of a shot."

Foster's Medical Dictionary defines "Spinal Concussion" as "A condition of the spinal cord produced by violent shock, such as may be caused by falling from a height, by a severe blow upon the back, or by a railway collision or similar accident. As complications, small extravasations of blood into the substance of the cord or rupture of nerve tissue may exist, also hemorrhage from the spinal meninges and subacute spinal meningitis caused by the initial injury. Paraplegia does not usually supervene. Paresis of one or more limbs, nausea, vomiting, a quick twitching and general prostration

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DEFINITION—HISTORICALLY CONSIDERED.

Looking at the word historically, we see that in 1490, Caxton, Eneydos X., 39—Juno prayd the goddys of wyndes that Euryche—sholde make concussyon and tormente in the ayer.

1541, R. Copland, Guydon's Formul. U, IV. Wounds or sores made with concussyons or strypes. R. Copland Galyen's Therapeutyke, 2 A., 11 b. The solution of the contynuyte called occhymosis in greke commeth most often from concussyon and ruption.

1651, Hobbes, Leviath. III, XLII 303. A concussion of the Heavens.

1656, Ridgley, Pract. Physik, 68. Concussion of the brain is made from an external cause.

1760, Tr. Juan & Ulloa's Voy. (1772) I, VI. I. 306. This terrible concussion was general all over the province of Quito.

1803, Med. Jrnl. IX, 177. The term concussion conveys not a precise idea of that derangement which is produced in the organization of the brain by external violence, on which account I have been induced to substitute that of contusion.

1825, J. Nicholson, Operat. Mech. 647—Less liable to be broken by shocks or concussions.

1847, Smith Tr. Chelins Surg. I, 411. In concussion there is always gorging of the brain with blood.

1879, Harlan, Eyesight, 11, 19. When the retina is irritated by the concussion of the violent blow—flashes of light—result.

1879, Carpenter, Ment. Phys. I, 11, 868 (1879) 72. "The spinal cord must have been in a state of concussion."

may severally or collectively occur. The temperature lowered after the accident may subsequently be found above the normal. Evidences of impaired digestion and assimilation are palpable. The effect upon the sphincters is variable. The degree and duration of general restlessness and nervous insomnia, as well as of the paralysis, depends upon the severity of the shock."

Let us look for a moment at the historical significance of the word "concussion." While this is not directly surgical, it may aid us in arriving at an understanding and correct use of the term.

The English Dictionary, on Historical Principles, by James A. Murray, defines concussion as "The action of violently shaking or agitating; particularly the shock of impact."

Second, as applied to surgery, Murray defines concussion as, "An injury caused to the brain or spine, or other part, by the shock of a heavy blow, fall, etc."

Thus we see that there is nothing in our best dictionaries, excepting that given by Foster, to support the use of the word "concussion" as descriptive of a special disorder of the brain or spine. In every other definition this word is used to describe the method by which the injury or disturbance was created.

We certainly could not accept Foster's definition as descriptive of a distinct disorder, as he plainly includes hemorrhage into and around the cord, rupture of nerve tissue, paresis and paralysis, as well as the general prostration and other symptoms usually described by various authors as concussion.

Let us look at a few definitions taken from our recent works on surgery.

Cheyne and Burghard, in their recent work on "Surgical Treatment," says that "By the term concussion of the spine is really meant a condition in which there is a molecular disturbance of the nerve cells, leading to temporary loss of function without any actual lesion."

Park, in his new work on surgery, says of concussion, "We inherit the term concussion from the earlier masters of our art, by whom, however, it was used in a much broader sense than of late. Its modern significance was given to it by Boirel, who made it apply to a group of cerebral symp-

toms the result of injuries not accompanied by fracture or perceptible laceration of vessels—symptoms varying in intensity and duration."

Park does not use the word concussion in connection with spinal injuries, but considers such injuries as contusions. He says, "The existence of contusion of the spinal cord has been questioned, but there is apparently no doubt that a severe lesion may take place in the cord without any external evidence of injury."

Opposed to the views of concussion given by Park, the following from "Albert's Surgical Diagnosis" is of great interest, although it refers rather more to the brain than the spine.

The characteristic symptoms of concussion of the brain are evidently a transient condition of depression. If irritative symptoms arise, or the depression grows more profound, the condition no longer is one of uncomplicated concussion. Some other brain lesion then exists.

One point requires emphasis. Loss of consciousness, no matter how transitory, must have been present if the condition is to be regarded as concussion. This, therefore, is the most distinctive sign, while slowing of the pulse is the objective symptom."

Thorburn, in his classical work on "Surgery of the Spinal Cord," says: "'Concussion,' on the other hand, is used in the vaguest possible manner, in the nosology of some writers apparently covering nearly all, if not all, the functional as well as some of the organic trumatic nervous lesions. The classical 'concussion of the brain' is a well-understood affection, representing almost certainly a definite organic pathology, viz., intracerebral hemorrhages. To such cases it should, I believe, be restricted for the present, as its otherwise vague signification only obscures our views of many affections capable of such more accurate description."

It seems almost equally certain that concussion of the cord represents as definite an organic pathology as that of the brain, that, as a matter of fact, hemorrhage is the basis of almost all of these cases. The spinal cord is far less liable to injury than the brain, on account of its greater protection.

Bailey, in his admirable work on "Accident and Injury," says: "In the chapter on injuries to the spinal cord it will be stated that there is still much doubt as to the existence of any such condition as concussion of that organ. The probability that head injuries may be followed by pronounced cerebral symptoms without there being any discernible lesions in the brain is very much stronger."

"As a designation for a pathological entity, the term concussion or commotion of the spinal cord should be limited to such conditions as may occur as a result of injuries to the back, or of general concussion accidents, and which have not been caused by pressure from displaced fragments of the spinal column or by hemorrhage in the spinal canal or into the substance of the spinal cord. The time has gone by when intelligent physicians were deceived by the supposed resemblance between such general functional affections as hysteria or neurasthenia and concussion of the spinal cord."

The following from a new English work on surgery, by Rose and Carless, gives still a different definition of concussion:

"This condition may be due to severe blows in the back, which do but little damage to the spinal column, or may be caused by accidents which lead to the infliction of greater mischief, but without any serious displacement of parts. 'The term concussion should be limited to those cases where energetic traumatic influences (falls, blows, collisions, etc.), have given rise to severe disturbance of the functions of the cord without any considerable visible anatomical change in the latter.' (Erb.) In fact, the term is really only applicable to those cases which recover more or less completely; if recovery does not ensue, minute extravasations or other lesions have been present, constituting a condition of contusion rather than concussion. It is somewhat doubtful, however, whether all these cases are not due to minute hemorrhages."

The following is from J. W. McDonald's "Surgical Diagnosis and Treatment:"

"Concussion of the spinal cord is a condition which probably never occurs, owing to the effective manner in which the cord is protected and steadied in the spinal canal. When injuries to the cord arise to which the term "concussion" seems applicable, the accident is probably a capillary hemorrhage, a laceration of the cord, or a vasomotor disturbance with exudation of serum.

"The symptoms of so-called concussion are those of shock —viz.: pallor, nausea and vomiting, syncope, cold perspiration, etc. The symptoms which point to the spine as the cause of the shock are numbness, tingling or even paralysis of the upper or lower limbs, and constriction of the chest. The treatment is absolute rest."

Again, I quote from Herrick's "Railway Surgery:"

"The theory that concussion of the spine with consequent injury to its cord can occur is an untenable one. Protected and suspended as it is, surrounded by layers of soft membranes, and nearly always by a "water bed," in the nature of the cerebrospinal fluid that fills the canal, there is no possibility that a mere shaking up or indirect force applied to the column, unassociated or uncomplicated with fracture or dislocation, will produce a material injury to this structure, or in any wise interfere with any of its functions. The cases that are reported as such, because symptoms referable to spinal cord injury were complained of without any bone lesion being demonstrable by physical diagnosis, are in all probability instances of sprain of the muscles of the back, hysterical or psychic affections, in no wise comparable to a true lesion of the cord."

I trust you will pardon this long recital of definitions and descriptions. They are quoted to show the existing misunderstanding of concussion. Each author defines it differently, or at least gives a different description of the signs and symptoms which it embraces. These quotations are made with the hope that we may discover a solution of the tangle into which the term has grown. Does it not plainly teach that there is no such disorder as concussion of the spine?

The matter would be made perfectly plain to everybody if the use of the word "concussion" was confined to the method in which the injury was received, instead of trying to make it also describe the resulting condition. If one will review carefully the various authors on concussion of the spine he will find more or less complete descriptions of sprains of the spine, shock and collapse; hysteria, either acute or chronic; neurasthenia; hemorrhage into the cord or its membranes; effusion about the cord and its membranes; chronic myelitis and malingering. Where there is such a wide diversity of opinion as to the meaning of a word or the description of

a disorder supposed to be described by that word, would it not be better to abandon the use of the word altogether in that connection?

Would it not be better for surgeons to understand that the word "concussion" describes the method by which the injury was received, using other more appropriate terms to describe the resulting disorder?

Wm. Thorburn, of Manchester, England, seems to be the only writer in the English language, as far as I am familiar with the literature, who has made a serious attempt to classify these lesions. In his classical work, "A Contribution to the Surgery of the Spinal Cord," he has a chapter on "Traumatic Hysteria, Especially in Relation to Railway Accidents." He classifies the group of post traumatic functional neuroses, usually spoken of under the general term of concussion, as follows:

First, "Acute Effects," which he subdivides into (a) shock or collapse; (b) acute hysteria. Second, "Chronic Secondary Effects," (a) general nervous depression, neurasthenia; (b) a more localized and defined depression of cerebral (cortical) origin; chronic hysteria.

He speaks of the classification as being tentative and somewhat arbitrary, but convenient for the purpose of reference and description. It will be noticed that two of his divisions, acute and chronic hysteria, are almost entirely of cerebral origin, and have little or nothing to do with the spinal cord.

In looking over the reports of cases given in the literature, as well as re-calling cases from experience, one is struck with the large number of cases which show undoubted evidence of injury to the cord, either by direct pressure or more often by hemorrhage, in which there was no evidence of injury to the spinal column.

Without having made an actual estimate, I should say that fully 25 per cent. of the cases at first diagnosticated "concussions," in which operative or post-mortem examinations were afterward made, were found to have such lesions. Moreover it is probable that the number of such cases occuring in practice is much greater than even this estimate.

A slight hemorrhage in or about the cord may easily give rise to great disturbance. There is abundance of evidence to prove that there may be extensive contusion of the cord without any external injury. The true pathology of these cases would seem to be hemorrhage of greater or lesser extent, causing direct injury to the nerve fibers and leaving a point of irritation, which forms the basis for later symptoms.

In railway surgery, or under any circumstances of violent and sudden shock or jarring, we have added psychical elements, which may far outweigh the true pathology.

Following the conclusions laid down by Charcot in his classical researches, we have, in a sudden and severe accident, such as railway collision, all the elements necessary for hpynotism of the patient, and the unnatural sensations in a patient subjected to such an accident, easily furnish "suggestion." Thus we have, as a permanent factor in all such cases, "auto-suggestion."

It is certainly the duty of the surgeon to use every possible means to eliminate these psychical elements from the case, and to discover, if possible, the true extent of the pathological lesion. A given case may be entirely psychical and have no pathological lesion.

Neurasthenia is probably more closely related to the lesion of the cord than the hysterical phenomena above referred to. The use of this term should be confined to the chronic after effects of such injuries and describe the general nervous depression supervening. By this time it may be entirely a functional matter, the original lesion of the cord having disappeared.

Believing, as we do, that minute or capillary hemorrhage is the true condition underlying most of these manifestations. we should seek more closely for the truth of each case, and not abandon it under the obscure and unmeaning term of concussion.

Given such a case the first manifestations will be those of shock.

In describing shock we cannot do better than accept the

definition given us by Crile in the admirable work on "Surgical Shock." He says: "Immediate depression or death from injuries or operations was due to one or more of the following factors: 1, Cardiac; 2, respiratory; 3, hemorrhagic; 4, vasomotor.

The phenomena produced by the operation of these factors have so many points in common that they naturally fall into a group and would seem to be appropriately designated as collapse.

Later depression or death from injuries or operations and due to a vasomotor impairment or break-down as the essential factor may be appropriately designated shock. Surgical shock is mainly due to impairment or break-down of the vasomotor mechanism. All the factors referred to as causing collapse may add to shock."

If the views expressed above are true, our classification of injuries produced by concussion of the spine would be as follows:

Primary effects:

1. Sprains.
2. Contusion of the spinal cord.
3. Minute hemorrhage into or around the cord.

Secondary effects or complications:

1. Shock or collapse.
2. Acute hysteria.
3. Neurasthenia.
4. Chronic hysteria.
5. Myelitis.

In dealing with a given case, we must distinguish, if possible, between a sprain, a contusion and a minute or capillary hemorrhage. Contusion of the cord, such as would be produced by a dislocation, severe twist or bend of the solumn immediately springing back into place, would also be accompanied by evidence of sprain. Minute hemorrhage would not necessarily have such evidences along the spinal column, but often result from a sudden shake or blow. While only one of these conditions may be present in a given case, we no doubt have many cases in which all these are present.

Our understanding of these cases will be much more rational and our treatment far more appropriate, if we accept hemorrhage as the basic lesion. If we can be sure that we have had no hemorrhage or sprain or contusion, then our case is purely psychical, and should be treated as such.

Every surgeon who has charge of railroad cases will remember many which have immediately recovered upon the payment of damages. If time permitted, I could report at least three in my past year's experience who have promptly recovered and gone to work at manual labor within thirty days after the payment of damages claimed. In these the injury was accompanied by a small amount of real damage. The "primary effects" were slight, but the "secondary effects" were greatly exaggerated, and continued long after the real injury was well. In fact, they only disappeared after an administration of the "gold cure."

I would not leave the impression that all such cases are psychical, but in many of them a pronounced psychical condition is superimposed on a very small and even transient pathological basis.

It is certainly the duty of every surgeon to protect himself, as well as any corporation he may represent, and the best interests of his patient, by distinguishing, if possible, between the purely psychical, secondary psychical, and the truly pathological condition, and our treatment should be made accordingly.

XXVIII.—SPINAL CORD INJURY.

SO-CALLED CONCUSSION OF THE CORD.

BY FRANK PARSONS NORBURY, M. D.,

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It is unfortunate that a truly scientific interpretation of concussion of the spinal cord has not yet been attained. As a result more or less controversy exists as to its real merits and its true pathology. It is a term that has become established by long usage and in even the light of modern pathology thus far, no term has been accepted which fully covers the clinical

picture which it aims to represent. As experience is accumulated in the observation of such cases and as neuro-pathology becomes more exact, it is to be hoped that this disputed condition in neurologic medicine may become more defined. From my own observation and study of the literature, I have concluded that the underlying lesion, in so far as the cord is concerned, is disturbance of the circulation, injury to the blood vessels and lymphatics. Hemorrhage is, I believe, the lesion, and this hemorrhage is into the substance of the cord (intramedullary). In support of this we have on the surgical side of the controversy the observations of Kocher, made with characteristic originality, also the observations of Thorburn, of Horseley, who, as a neuro-pathologist as well as a surgeon, stands pre-eminent. Then the work of Charcot, Oppenheim, Dana, Walton, Strumpell on the side of the neurologists, most of whom are inclined to view the structural changes as probable. Other observers, notably Wagner and Stopler, lean towards this belief. Neurologists, however, have varied views, some of which are essentially hypothetic. Most of them agree that degenerative changes or secondary vascular changes are responsible for the symptomatology of the disease. In support of the view of hemorrhage, facts seem to be circulating that are both tenable and reasonable.

Many injuries to the spinal cord have no external evidences of injury to the spinal column. The column itself is intact and injury to the cord is due to the traction put upon it by the violence of the accident or to severe contusion. The symptoms which follow, many of which are slow in appearing, indicate structural changes occurring in the substance of the cord or to irritation arising from meningeal involvement. In pronounced cases of hemorrhage the symptoms are those of sudden interruption of the functions of the cord and the varied sensory and motor changes soon enable a diagnosis to be made. The localization of the lesion usually can be outlined. The progressive degenerations which sooner or later follow serve to more fully establish the diagnosis and the seat of the lesion. In the less extensive lesions the symptoms may vary, and by reason of the fact that hemorrhage may dis-

appear, the continued interruption of cord function is rare. Sometimes this fact confuses the diagnosis, but ordinarily it should not, but on the contrary, should be accepted as evidence of the previous existence of hemorrhage.

In the obscure cases which have latent symptoms and slow convalescence, the lesions have been less pronounced and probably in regions where the functional activity is less liable to be influenced by hemorrhage. Certainly in the so-called cases of chronic traumatic neurasthenia, which are slow in development, we have some evidences of functional impairment not unlike those noticed in cases of hemorrhage where the diagnosis is not questioned. For this reason we have a comparative basis, at least, for reasoning that in concussion of the cord, which is only a part of chronic traumatic neurasthenia, we have some evidence that hemorrhage is the lesion for special interference with activity of the spinal nerves. I have noticed system symptoms in one case where the sensory changes were limited to one side and vaso-motor symptoms, also unilateral, all of which lead me to believe that the original lesion was intramedullary and probably hemorrhagic. The root symptoms in this case were noticed at the beginning, showing irritation, which may have been meningeal, but not root symptoms also noticed in this case may have been from degeneration of the cord.

Bruns and Worscheid call attention to a fact due to the anatomical peculiarity of the origin of nerve roots. "That in otherwise serious lesions those nerve roots which merely pass by the injured cord to reach their point of emergence from the spinal cord, and which, for instance, in the dorsal portion of the vertebral canal are derived from segments considerably above the seat of the injury are well preserved; while *a priori* it would be assumed that these roots, lying as they do particularly close to the injured cord would be more liable to be affected than the cord." In general the roots are more resistant than the cord and this not only with reference to traumatisms; to be sure, their power of resistance does not go beyond a certain limit; when the trauma is very forcible, they are likewise torn.

Hemorrhage is common in traumatism of the cord. Oppenheim states that fully nine-tenths of cases of traumatic injuries to the cord have hemorrhage as a factor in the production of symptoms. Falls on the head or violent throwing of the body forward, striking upon the head, as in railroad accidents, causes a bending of the body at near the cervico-dorsal junction, strains the cord and thus causes hemorrhage, without any evidence of injury to the spine itself. The hemorrhage is in the gray matter of the cord, as is shown by the symptoms, viz.—involvement of the posterior horns, also the anterior horns, or both. In pronounced cases the hemorrhage is usually diffused longitudinally, producing system symptoms. Dr. Black had one such case, which beautifully illustrates the progress of the diffusion of the hemorrhage by the progressive evidences of sensory involvement. In this case there was no question as to the diagnosis, but in cases not so pronounced at first, but which weeks later show progressive system symptoms, are we not justified in believing that hemorrhage existed? I see no reason why tubalor hemorrhage cannot occur slowly and by degrees as well as rapidly.

Take the cases where brachial symptoms are slow in development, is it not possible that hemorrhage has occurred in lower cervical region? Or the more common cases where irritation with paralysis occurring later, in which the bladder and rectum are involved, that hemorrhage has occurred in the lumbar region? I know there are well-defined cases and are not truly of the type classed as concussion of the cord, but they are nevertheless frequently called cases of concussion. In my judgment, they give us a clew as to the condition existing in the more obscure cases. In comparing the symptoms as they appear in chronic traumatic neurasthenia with those of concussion, we note a similarity, especially as regards the sensory and vaso-motor changes. For example, take the special sense vision, which is interesting and worthy of exhaustive observation.

In traumatic injuries of the cord in the lower cervical and upper dorsal it is not unusual to have mydriasis or narrow-

ing or immobility of the pupil. Albert explains this by saying that the nerve center which controls the size of the pupil lies in this part of the cord, and is therefore exposed to irritation. I have noticed this feature in one case of so-called concussion of the cord. Again, the subjective asthenopia, the misty field of vision and the sense of fatigue on using the eyes. Also photophobia in consequence of which patients want to remain in the dark. The subjective symptoms, however, wherever found usually belong to the pure neurasthenic cases, where the brain symptoms, so obscure in their pathology, predominate. We are not yet safe enough in our advancement in neuro-pathology to claim that neurasthenia has or has not a structural basis. The mental element in these cases rules the phenomena of the disease, but withal we find many symptoms which can be explained by circulating changes.

It is impossible in the study of concussion of the cord to eliminate the physical element—that element which eventuates in the development of traumatic neurasthenia. The importance of recognizing the definite and demonstrable symptoms is evident, because frequently the subjective symptoms, coming on suddenly, completely obscure the real, the objective symptoms. The symptoms which come on gradually and are sufficiently pronounced to be a source of disturbance to the patient, are the ones which, in my judgment, proclaim the hemorrhagic origin of the disease. The pathology of this condition, while more or less speculative, is nevertheless leaning towards the hemorrhagic theory. Nervous diseases, for many years said to be functional, are, in the light of modern inquiry, looked upon as due to organic changes, be these changes ever so minute, and so in concussion of the cord, I am sure, will, as the research work goes on, be demonstrated beyond question to be due to hemorrhage or circulatory changes affecting in some way the minute structure of the cord.

DISCUSSION.

Discussion of papers by Drs. Black, Norbury and Manley.

Dr. Wellington T. Stewart, Chicago.—The paper of Drs. Black and Norbury so completely covers the subject that

my appreciation of it leads me to open the discussion. I think they deserve the thanks of the Association for their able scientific contribution.

In answer to Dr. Manley, who advises so strongly against early operations on the cord, I will say that I believe the gentleman is sincere in his assertions. However, some of the rest of us are justified in making our assertions just as emphatic from our experience. My own experience as surgeon with certain companies in Chicago where I have had over forty cases of injuries and fractures of the spine, I believe justifies the operation. I can see no danger in an exploratory incision to diagnose the injury and ascertain if there is an impaction of the column and compression on the cord. I believe by early interference that compression can be relieved, when if left for nature to cure we might get pressure atrophy of vital parts. I don't stand before you to say that every fracture or compression of the spinal column can be cured by operation, but I believe the outlook is on the side of operation. In our present light and understanding of the X-ray machine it is very easy to diagnose misplacement or fracture, certainly if they are very extensive. Probably some of the gentlemen who live in the smaller cities and towns have not the benefit of the X-ray appliances, and they would be justified in using caution and waiting, but if the surgeon can get the benefit of a skiagraph, or the X-ray machine, and he feels satisfied there is compression on the cord, an early operation is advisable.

Dr. Hugh T. Patrick, Chicago.—In regard to the operative interference in fracture and dislocation of the spine, I do not care to say anything, but in regard to the paper of Drs. Black and Norbury I would like to say a word.

I agree with the tenor of Dr. Black's remarks that one is never justified in making a diagnosis of concussion of the spine other than as a mode of injury. Nobody ever saw a concussion of the spine as a condition. It would be just as reasonable to say that a man has a continuous jolt of the brain. If the spine has results from that bump, it is something which is perfectly plain in ordinary pathological parlance as a sprain, contusion or rupture of a ligament or blood vessel. I should like the authors to have drawn a little finer distinction betweeen so-called concussion of the spine and of the spinal cord. There is no more similarity between concussion of the spine and spinal cord than there is between the spinal column and the spinal cord themselves. They are absolutely different, pathologically and structurally. Then

concussion of the spine as a condition ought never to be spoken of, because it never exists. Concussion of the spinal cord might exist in this sense—when a man receives a pretty good blow somewhere about the head, he is sometimes knocked senseless; it takes a few seconds before he can get up, and that is the end of it. That is, strictly speaking, I think, a concussion, and that is the only condition of that sort of thing—in which there is a sudden transitory loss of function—that we may be permitted to call a concussion. Any result of a blow, or a twist or bending of the back, which causes more than a transitory loss of function is not a concussion of the spine; it is an injury to the nerve cells or fibres, which could probably be demonstrated under the microscope, or a rupture of the spinal blood vessels in or around the cord, which is a plain pathological condition.

The confusion of these things dates back to the days of our very inaccurate and limited knowledge, and if surgeons would take the time to acquire familiarity with the various symptoms used in making an accurate diagnosis, there would not be so much confusion. We should examine for sensitiveness to touch and heat and cold, carefully search for atrophy, state of the reflexes, electric reactions, co-ordinations and for the various things which go to answer not only the question of a lesion, but where the lesion is located, and in many cases this could be quickly and easily done. Some years ago a surgeon asked me to make the localization for a laminectomy. The patient was a level-headed, quiet fellow, doing his practice in spite of a total paraplegia, and I was called in to say which lamina should be removed. In this case there was no lamina removed, and the man walked into my office six weeks later. He had a purely hysterical paraplegia, which resulted from falling from a hay loft. I recently saw a case exactly similar to that one, that of a man who was thrown from a buggy and lived eighteen years under the apprehension that there was organic disease of the spinal cord. He has no sign of that, but he has a functional trouble.

Dr. Manley, in closing.—I was very pleased to hear of Dr. Patrick's case of cure, even though it was by suggestive laminectomy. The point I want to fix, and I cannot fix it too hard and strong, is not a theory at all. It is a fact that the spine can be *fractured,* and *re-fractured,* without any symptoms at all. You cannot discover a fracture by compression only when the laminæ are involved. When fracture involves the body and there is no displacement, laminectomy

does not throw any light on it. The spinal column is not a body that permits of very much extension. Over and over again I have produced these fractures in animals, and finding no symptoms, have killed them, cut down on the arches looking for the fracture—not finding it—and at first I took it for granted that there had been no fracture of the vertebra; yet I had heard the snap and was not satisfied with the laminectomy; later, on autopsy, I took out the vertebral column, and when stripping off what is known as the anterior vertebral membrane, I have there found the body fractured and shattered.

Laminectomy is a procedure not without danger. I don't think any surgeon will set it down as a trivial undertaking. After you have removed the arches, you have left a defective area. What are you going to do to remove the loss of bone destroyed? That is why I speak so strongly on the point, and why I must emphatically oppose early operation in all cases. I have seen time after time, when paraplegia was probably due to a hemorrhage or sudden straining, or contusion, or laceration, the patient, after a week or two, would get up and walk out of the hospital. I think it would be a very serious affair to put that man's life in danger and remove some arches of the vertebral column simply for exploratory purposes. With me, this is not a matter of theory. I have been able to prove it by demonstration.

Dr. Black, in closing.—I will say a word. In discussing Dr. Manley's paper I have nothing to add to what I have already said in that connection. I have been familiar with what Dr. Manley has written from time to time, and greatly interested and instructed by it. But from the experience I have had the cases do not recover without operation, and many do not recover with operation. This led me to study the reports of a large number of cases of spinal injury reported in recent literature. Altogether 555 cases were studied. All presented symptoms.

I don't think any of us would attempt to operate on cases that did not present symptoms. Those that were operated upon showed 25 per cent. more recoveries than those upon whom no operation was performed. Now, it seems to me, there is a lesson in this. Taking so many cases from the experience of many operators ought to be of some value, and it is this point that I want to emphasize. These statistics seem to teach that our results can be improved 25 per cent. by early operation. If there is a fallacy in them, I would be glad to have it pointed out.

XXIX.—TREATMENT OF TRI-FACIAL NEURALGIA.

BY TRUMAN W. BROPHY, M. D., D. D. S.

CHICAGO, ILL.

Surgery of the oral cavity and its adjacent parts, including facial deformities, will ever be of great interest to the surgeon, as it not only requires great skill of the diagnostician, but delicacy in manipulation is demanded in order to obtain good results and avoid conspicuous cicatrices and other deformities of the mouth and face.

It is customary for the general practitioner of surgery, when operating on the maxillary bones or in the performance of operations within the mouth, when of considerable magnitude, to make external incisions to gain access to, and a full view of, the field of operation. I hold that these external incisions, followed as they are by the formation of scars, are, in a large majority of cases in which they are made, wholly unnecessary.

For example, a patient suffering from persistent neuralgia of the second or third division of the fifth pair of nerves, having undergone medication extending over a period of many months with only temporary relief, is taken by his physician to a surgeon for diagnosis and treatment. The surgeon decides that a nerve lesion exists and that an opertion is required by which to cure the patient.

The patient is prepared, the operation is proceeded with. and an external incision is made in accordance with the location of the lesion. If of the inferior nerve, the incision is made along the border of the jaw; the tissues are reflected up so as to expose the external surface of the inferior maxillary bone; a hammer, mallet and chisel are made use of, the bone is chiseled away so as to expose the inferior dental canal, and the nerve removed. A saw is sometimes employed instead of a chisel for the purpose of removing the external layer of bone covering the canal. The wound is closed by suturing, and the patient is cared for antiseptically until the wound heals.

These external incisions are wholly unnecessary, as the op-

eration may be successfully performed within the mouth, proceeding as follows:

A small incision should be made downward from the mental foramen, so that the canal may be entered with a silver probe, then a drill after the form of Gates' dental root canal drill, exaggerated in size, may be carried into the canal and the contents thoroughly removed.

In order that the nerve may not redevelop, as it is inclined to do, the canal may be drilled out so as to freshen the surface of the bone, thus causing an exudate to take place from the freshened bony surface, and the consequent filling of the canal with bony tissue. Experience has taught us, however, that the canal does not always fill with osseous tissue and the nerves will be reproduced in certain cases.

I am of the opinion that there is no more reason for making an external incision for the removal of the inferior dental nerve within the substance of the maxillary bone than there would be to make an external incision through the cheek to gain access to the third molar tooth for the purpose of entering the pulp chamber and removing the pulp therein.

Abnormal conditions of the second division of the fifth pair of nerves, or the infra-orbital nerve, frequently require surgical operation for their cure. It has been customary in performing these operations to make external incisions for the purpose of entering the infra-orbital foramen and making exsections of the nerve. I have found that equally good results may be obtained by raising the cheek and making an incision over the cuspid teeth, dissecting up the soft parts, seizing the nerve with a tenaculum as it makes its exit from the infra-orbital foramen, carefully dissecting out its branches distributed to the cheek, then increasing the size of the infra-orbiital canal by means of a drill, seizing the nerve, drawing it forward, and dividing it, will accomplish the same end that may be gained by making an external incision.

The following letter, written by that distinguished surgeon, Prof. Edmund Andrews, A. M., M. D., LL. D., of the Northwestern University Medical School, recently received by me, enters into an explanation why pain, though com-

pletely arrested by operation, may recur within a period of two years, and how finally it may be cured:

Chicago, March 4th, 1902.

Prof. Truman W. Brophy:

My Dear Sir.—In reading your interesting clinic on trigeminal neuralgia I am not clear that I understand fully the late doctrine about the inervation of the teeth. The opinion given in your lecture is that the inervation of the tooth is direct from a plexus surrounding the root, and not from a dental branch from the fifth pair. Do the supporters of this opinion hold that the plexus derives its sensation from a connection with the fifth pair, or is it believed to be an offshoot from the sympathetic system, like the principal nerves of the digestive system, etc?

What is the accepted opinion about this?

I have found, much to my surprise, that a case could be helped for a year or two, by an incision or avulsion after an operation through the ramus, yet if it relapses, the cure can be repeated by opening in the same spot, detaching the circular cicatrix, closing the trephine hole by cutting around the edges, and twisting it forcibly out, though no trace of the old stump may be found. I have operated several times on the same spot within a year or two with success each time.

I have found the plan to be of considerable value in practice, and weak, old patients seem to feel no shock, probably because the incisions are done in cicatrical tissue, which has very little vascularity, or nerve supply. I don't see any reason in it unless this may be true. The cicatrix may be supposed to be attached in its deeper apex to the stump of the nerve, and in twisting it out it may effect a nerve stretching, or, in other words, a hive of operation on the stump.

I have excised the Gasserian gangloin five times, but other surgeons as well as myself think less favorably of it than formerly. This matter of secondary operations by twisting out the old cicatrices is of importance, though it looks at first glance unreasonable. Working in the old cicatrix is eminently free from shock and hemorrhage. Relapses after either primary or secondary operations are very generally, or at least often, much milder than the original disease. Some are permanent cures.

Yours most truly,

(Signed.) EDMUND ANDREWS.

In answer to Prof. Andrews' question as to how the tooth pulp receives its nerve supply and nutrition, I have stated

that the nerve supply is from the fifth pair, although a nerve branch does not proceed directly from the trunk into the tooth canal, as works on anatomy teach, but the branches given off from the trunk are distributed to the bony septum between the roots, and minute branches are distributed to the pericimentum and enter the foramen to be distributed to the pulp.

Operations for the removal of tumors of the oral cavity of various kinds may also be performed without the external incisions. The tumor known under the name of epulis, occurring, as it does, about the margin of the gum, but having its origin in the periosteum, growing sometimes to an enormous size, may be removed in all cases within the mouth without external incisions.

The method of procedure in removing tumors of the superior maxillary bones has been to make an incision usually through the medium line of the lip to the septum of the nose, thence around the ala of the nose to the inner canthus of the eye, dissecting up the cheek, reflecting it backward, and then to proceed to remove the superior maxillary bone, together with the tumor, through the incision made.

I have found that such a procedure in a large majority of the cases in which it is employed is unnecessary. Tumors, especially of the sarcomatous or carcinomatous type, do not always affect the bony tissue of the hard palate except by the absorption of those bones by contact and pressure. Especially is this the case in the formation and development of giant cell sarcoma, a tumor so frequently met with in and about the oral cavity.

XXX.—NORMAL SLEEP VS. DRUG UNCONSCIOUSNESS.

BY J. B. LEONARD, M. D.

NORTHAMPTON, MASS.

Whatever opinions are prevalent in a given community at a given time, those opinions become grafted upon the grey matter of the new born generation and remain there until other opinions are offered, or until the germs of original re-

search develop in the individual and he seeks to fathom the first cause of any and all opinion with reference to the matter under consideration.

When the family doctor entered my childhood home, away back in the Green Mountain State, two days after the call, and solemnly declared there was but one remedy that would save my brother's life, and that remedy he had not brought with him, I was as ready to undertake the long and perlious journey through piling snows to bring that remedy, and as quick to believe that life absolutely depended upon it, as was then the dying man to endorse the divine functions of the good minister, and repeat after him the required formula of words meant for repentance and salvation.

During the half century since I brought home that specific essential oil for the cure of acute inflammatory rheumatism, prescribed by that good old medical saint in whose saddle-bags could always be found the knife, the saw, the dental forceps, and every leaf and root and oil except the one most needed—in this half century what changes have been wrought respecting the use of leaves and roots and oils and extracts to put upon the inside and the outside of mortal man and immortal woman, when they found themselves in the throes of agony at mid-life, or in the wreck of dissolution at the sunset period.

To doubt the value of any well known remedial agent used in the spring time to cleanse the blood would have been quite as unorthodox as to question the value of wearing a red string about the neck to prevent nose-bleed. But today, though the United States Dispensatory still exists, and though it, like the Bible, undergoes periodical examinations and excusions, I know of no practitioner in New England who copies its formula for diphtheria, typhoid fever or tuberculosis.

Normal sleep is that tranquil, unconscious condition into which the normal human animal falls at the end of each successive day, for renovation and repair. It is a vacation between periods of activity. Without it all functions of all the organs would gradually fail, and life itself would early cease to be. With only a part of the required daily amount, which

I will here estimate as one-third of the full day, or eight hours, the body fails of complete development, and the organs of doing their full work.

For my purpose today I have designated abnormal sleep as drug unconsciousness. At the meeting of the British Medical Association in Montreal five years ago, in the one day there given to papers and discussion upon Insomnia, but one opinion was expressed in the final conclusion, viz; how deplorable it is that we, in any case, are obliged to supply the imitation of sleep, in place of real sleep, through the drug narcotic.

I will assume here that the members of The Mississippi Valley Medical Association all have equally advanced estimates of the value, yes, the necessity of genuine sleep; and that you deplore more in 1902 than did that body in 1897 the seeming necessity of using any agent to bring unconsciousness in place of normal sleep. I will assume also every member here will agree with me that the hospitals and sanitoria now existing throughout our broad land, from east to west and north to south, erected and maintained for the purpose of treating the drug habit. I will assume you are not to disagree with me when I say these in future will be regarded as the representative monuments of the early folly, or the commercial phase of the medical profession.

After twenty years investigation, I believe drug unconsciousness in place of natural sleep, for the indoor brain-working classes, is not only a disgrace to regular medicine, but it is a disgrace to all the educated professions. We ceased many years ago to exclude water from the fever-stricken sufferer, and water now is regarded as the best of all remedial agents except an atmosphere unpolluted. We have just turned the tubercular patients, acute and chronic, into the open air. The results speak for themselves; excluding advanced cases, recovery follows.

Nature, only, knows how to build and rebuild. In no human artificial incubator can we supply the life principle. When I ask the gray-haired member, who occupies a chair in the University Faculty, how long we are to ignore nature,

and substitute art in the treatment of suffering humanity, the answer—that the laity must have drugs—has a political coloring we ought not to be proud of. When the ethics, so-called, of the great medical body of which we are part, are so interpreted as to call for mysterious chemical combinations written in a mysterious language, rather than corrective measures spoken in plain English, I estimate we are still patching up old platforms, though the time is ripe and our intelligence demands the making of new ones.

A leading author and editor in our profession says: "In this age of rapid advancement, what was science in the medical profession yesterday is only half true today, and may be wholly untrue tomorrow."

The conditions of normal sleep, however, are the same yesterday, today and forever; and normal sleep follows invariably these conditions. The activity of all the parts and organs of the normal animal, lower or higher, during the day, leaves all the parts and organs in need of a repair, which, though constantly going on, is not fully completed during the day's activity. The period of rest, the vacation between activities, is called for, and during these periods normal tissue is restored and the broken down consigned to the exterior through the various channels of exit.

Our advanced science, if it means only new declarations from self-appointed exponents, changeable and changing with every new issue of a medical text-book or medical journals to keep in advance of the strenuous lead, is not worthy the name. Our profession may well be proud of its attainments in anatomical and physiological research, in pathology also, but our efforts to compete with nature in the repair of lesions, of the substituting periods of artificial unconsciousness in place of natural sleep—this we shall be obliged some time, or the historians will, to class with the numberless other achievements that were scientific one day, half-scientific the next, and wholly untrue when brought before the supreme tribunal.

The indoor brain worker is necessarily an abnormal product. He employs largely only one organ in the daily routine

of duty—the brain. The trolley brings him within a block of his business, muscle is little used, or wholly neglected. If he rides a wheel, it is good as far as it goes, but there is not enough of it and not enough time or moderation in its use. He is not all-round tired at the sleeping hour. He is not all-round fatigued even, though the brain becomes fatigued, tired perhaps, long before the day ends. When the sleeping hour arrives—after the dinner with coffee, after the smoke and after the evening of social converse, the brain has not become less in need of rest and repair, less in need of real sleep, though no sensation from the brain at eleven or twelve o'clock announces this condition.

Indeed, a new activity now springs up after the electric light is turned off, and the head is laid upon the pillow. Sleep is due for the brain, though the brain refuses to acknowledge it. Sleep is due for the repair of all the organs, though none are so urgent as the brain, but sleep does not come. Muscular inactivity during the day has helped to keep normal sleep away from this brain worker. The pathologic brain function, called "automatic thinking", is the immediate obstacle now to contend with. Here opium, chloral, whiskey, the bromides, etc., have been resorted to for establishing temporary unconsciousness, and we must increase daily and constantly the amount used. We must accept a pathological condition, for a physiological state of repose.

The results of this artificial measure have already been alluded to. I need not attempt to emphasize the inevitable damages and dangers hanging over the drug taker for sleep-producing purposes. You know his pitiable condition and his brief hold on the active brain-working business life that gives no time in the open air for physiological exercise, which is inevitable to a well rounded life. You know how imperfect is the diagnosis, often, following conditions induced by long continued use of whiskey or opium.

You don't want to exchange your position for his.

How can the indoor brain worker by day get normal sleep at night without the paralyzing drug influence? Had he used muscle by day, as well as brain, in open air; had he be-

come all-round tired, normal sleep would have met him more than half way.

But he lacks this uniform condition of fatigue, and in place of normal sleep, an enemy appears. This enemy turns a key and lets the current on. A belt is placed upon one of the many shafts in the brain workshop, and automatic thinking is the result. Now automatic thinking is pathological; it is absolutely incompatible with sleep. Automatic thinking is omnipresent during the hours we lie waiting for sleep. I know no exception to this. It is the enemy, the only enemy we are now and here considering. When the automatic thinking ceases, sleep ensues. How can we turn off the power current and the belt?

After long years of experimentation with mental effort alone, such as you are all familiar with, and mental effort superintending muscular activity in the basement with the wood saw, or upon the highway trotting around the course, I condensed my whole field of activity to my room and bed. Here I was alone. In brief, I found I could accomplish as good results without dressing and undressing, as with, and almost without any perceptible motion whatever, by contraction and relaxation of certain groups of muscle, under dictation of the will power. All the required conditions may be improvised at once in any attitude we may elect for sleep.

In brief, as an object lesson, take in hand the respiratory functions, reduce the number of inspirations and expirations one half; make each one full, deep and prolonged. Make the expirations correspondingly complete. Let each successive effort be exactly like the former, in the taking in and sending out. If you please, you may be so moderate in these steps as to be conscious of a new condition in the circulatory system. This is in no way essential, however.

Another experiment with the respiratory apparatus is to forbid all activity of the diaphragm. Let the chest muscles alone carry on the respiratory work. Here a greater frequency is called for. A new piece of work is to be done. You were employed here as before to superintend it. You are not to desert your post consciously. This last, like the first, com-

bines a physiological effort to head off a pathological function. You will soon find the two here are absolutely incompatible. If the persistence of the pathological side be so unmanagable as to resume from time to time the broken thread of automatic thinking, you may add another duty to the physiological side. You may flex and extend the hand, the foot, a finger or a toe, along with the uniform taking in and letting out of air.

You seek only a balance of circulation in the chambers of grey matter. You call away arterial blood from one part to make use of it in another. You are soon unconscious, not only of the presence of the enemy—automatic thinking—but you have forgotten to watch him, because "tired nature's sweet restorer" seizes the first opportunity to seat herself upon the throne. When once there, normal respiratory work goes on, normal circulatory work goes on, normal repair goes on, normal discharges of excrementitious matter is forced through its legitimate channels. You waken a new man.

Now this object lesson, while you assume the control of respiration and circulation, and accomplish your object, as you always will, this is but one of many scores of experiments you may make use of to the same end. Every muscle and every group of muscles in the body within the command of the owner may be extemporized to do its part.

Extend if you please the trunk and extremities. Reach the head board and the foot board at the same time, if you were made long enough. Lie upon face or back, as suits you best; change from one side to the other. See how long you maintain this enlargement of yourself physically with a new sensation pervading every muscle engaged. Does automatic thinking persist? No, you are soon conscious of one thing—the rather strained condition of muscle. You would like to be out of it, but you have a contract here just as binding as in all the other engagements. You are not to forsake duty.

So much comes from opening the door, looking into the workshop of the brain and adjusting all the currents of power and the belts that control the respective shafts there existing.

DISCUSSION.

DR. T. D. CROTHERS, of Hartford, Conn.—This paper is a very interesting one, in that it brings out a physiological fact which we do not consider sufficiently in our treatment, namely, insomnia is only a symptom, and one remedy is to divert the mind in order to give rest to certain *functional activities.* We do not know what insomnia means, but we do know that by diverting the mental faculties and by putting into activity certain sets of muscles, sleep follows. If the essayist had time, it would be interesting to us for him to describe the method of putting into activity certain sets of muscles, going through certain gymnastic exercises, and thus to withdraw the blood from the brain. By diverting the mind, and exercising certain groups of muscles, the brain becomes tired and sleep is induced.

As to the protest made by the doctor against the use of drugs for the induction of sleep, I will say that too many drugs are given and taken for sleep, which are ruinous in the last degreee. If there is any means or method by which we can produce sleep without taking narcotics, it is to be welcomed, and we have gained a great deal. I think it would be well for us to practice the method which the essayist has outlined.

DR. J. M. ALLEN, of Liberty, Mo.—There are certain physiological facts to be considered in this paper. First, the greatest amount of blood is in the brain when we are in active work; the least amount when we are asleep. Another fact connected with it is this, that it is a physiological impossibility for any individual to have a digestive tract that will support the highest development of muscle and the highest development of brain at the same time. I have never seen such an individual. Another fact connected with it is this, that it is unnecessary for a patient afflicted with insomnia to lead a quiet life during the day or at night. Some of the worst cases of insomnia I have ever seen were in persons who had led active lives physically and mentally. The fact is that insomnia cannot exist without an increased amount of blood in the brain. To put it another way, the very existence of insomnia carries with it the idea that there is an increased amount of blood in the brain. The dilatation of the cerebral arterial system is carried on to the point that the blood vessels lose their normal tonicity. I heartily endorse the paper, and believe that the essayist has given us a new method.

I agree with him in regard to the use of drugs for the purpose of inducing sleep. That the bromides have been beneficial, there can be no question; also ergot; but I object to the use of opiates or any drugs that increase the blood supply in the brain, but I do not object to the use of those that decrease it and cause contractibility of the blood vessels. The essayist has given us admirable suggestions. It cannot be gainsaid that if we attempt muscular action, we take blood out of the brain, and permit a man to go to sleep in a physiological condition. I do not believe so much in diverting the mind for the purpose of inducing sleep, but if we can get the blood away from the brain, a man will go to sleep.

DR. HUGH T. PATRICK, of Chicago.—After listening to the doctor's phillipic against drugs and his panegyric on sleep, I would like to have a little more definite information about the results of this treatment which he advocates *en masse*. The essayist spoke of the effects in his own case, and I do not know whether he means himself, personally, or a case in his own practice. If he means his own practice, I would like to know, if possible, the percentage of successes, and in what sort of cases.

There is nothing more calamitous than to consider sleeplessness as an entity to be treated. Sleeplessness as a disease, is never to be treated, in my opinion, but the cause of the sleeplessness is always to be treated, and I have no doubt the method suggested by Dr. Learned, with which I have been more or less familiar for a number of years, is a good one in some cases.

DR. LEARNED (closing the discussion).—In reply to the inquiry of Dr. Patrick as to the number of cases treated by this method and the percentage of successes, I will say that I know nothing about that from experience. I have not called patients to me. I am not at the bedside. I have given instructions to a few of my professional friends as regards this method, and it has been an easy matter for me to get before national and local medical associations, by invitation, and describe this method of inducing sleep. The causes of insomnia may be traced back to the mother and father, if not back to the grandmother and the grandfather, and they can be traced back to early life in the kindergarten, the primary, secondary and high schools, and back to the time when men and women were being graduated. Our conduct of this class of cases most emphatically demands the treat-

ment of causes, so far as possible, but above all other things, of the symptom of insomnia itself, now and constantly. I allow it is a symptom, but I cannot agree with Dr. Patrick or any other person that we are not to deal with this symptom absolutely, from beginning to end, because there is no possibility of repair of any organ or function of the body, in part or in whole, unless we have a fairly good amount of normal sleep to depend upon; and the more sleep, the better. Normal sleep will do it. Then, I will say, every brain-worker, barring a few excessive cases, persisting in this course, will get sleep by the method I have described.

XXXI.—NEURASTHENIA.

BY GEORGE F. BUTLER, M. D.
ALMA, MICH.

Neurasthenia was early recognized by nosologists, as Muller and Arndt have demonstrated. Robert of Edinburg over a century and a quarter ago distinguished between hysteria, hypochondria and neurasthenia, remarking that there are three classes of neuroses and that: "The complaints of the first of the above mentioned classes may be called simply nervous; those of the second, in compliance with custom, may be said to be hysteric, and those of the third hypochondriac." In 1851 Sandros entitled the nervous condition thus designated "the nervous state." Later Bouchat denominated the condition "nervosism," a term that still survives in French nosology. One conception of neurasthenia was much older than the observations of White would indicate. A condition entitled "nervous adynamia" developed, according to the clinicians of the sixteenth century, on a basis of mixed nervous exhaustion and toxemia, produced by the essential fevers, starvation, worry and allied causes, the condition being regarded as the basis of various neuroses arising after the conditions named and persisting in acute and chronic forms.

The term neurasthenia appears in Dunglison's Medical Dictionary nearly three-quarters of a century ago, side by side with its German synonym "nervenschwache." This synonym was in all probability a Pennsylvania Dutch equivalent, since, as Dercum remarks, contemporary German dictionaries do not

contain it. "Pennsylvania Dutch" medical practice contains not only folklore, but science of the earlier centuries as well. The present clinical entity neurasthenia, first demarcated by E. H. Van Deusen of Kalamazooo, Michigan, thirty-five years ago, was later forced into recognition by G. M. Beard, of New York. Both gave a clear-cut conception of the neuroses. Van Deusen had found the condition in foreigners as well as Americans, and hence avoided the error into which Beard was led, through the purely gratuitous assumption that Americans were a nervous race in the nosologic sense. Beard here confounded physiologic reaction with idiopathic neurosis cant of the pessimist regarding the disappearance of the Golden Age, and led to the assumption that the disease was a product of luxury. Like insanity it was, however, more frequent among the hard-working, isolated female farming population and factory employees than among the middle class of wealthy city population. Indeed, as dispensary practice shows, the restlessness of neurasthenia often underlies the tramp habit and leads to undue accretion of rural neurasthenics in urban districts.

The present seeming frequency of neurasthenia is due to better diagnostic facilities arising from better treatment and to the partial disappearance of the unwholesome medical tendency to accept disease as existent only when due to a palpable organic lesion. Careful study of the literature of past centuries reveals great frequency of neurasthenia and hysteria, but these conditions were usually regarded as the product of idleness or "vapors," unless associated with organic disease. To this mental bias is due the success of the quack with so-called organic diseases diagnosed by reputable physicians. "The man behind the knife" out for a fee was responsible for many "cures" by quacks, of patients who refused operations. One phase of the bias was well presented by Goodell, who, speaking of nerve mimicry of uterine disease, remarks concerning the first seven decades of the 19th century, that: Cauteries became the order, in fact, the ruling passion of the day. In the general enthusiasm it was soon forgotten that every mucous membrane secretes, and that it must of course give

evidence of its own secretion, just as every nose contains its mucus. Hence, every examined womb being found to contain mucus was, as it were, invalided—that is to say, it was put on the speculum list. Naturally, not a womb being found healthy from the speculum standpoint, this much abused organ was charged with being the cause of almost all the ills that female flesh is heir to, and was treated—that is to say, maltreated—for every imaginable disorder that could not be refered off-hand to some other organ. The ball and chain of tradition still drags at the heel of this branch of science and the medical mind, in close touch here with the lay mind, tends to give the reproductive organs undue importance—to attribute in fact, altogether too much to their influence. By a very large number of practitioners, even by specialists working in other fields of medicine, these organs are too often wrongfully made the scapegoat for headaches and nape-aches, for spine-aches and backaches, for weakness of vision, for aural disturbance, for sore throat and weak lungs, for irritable heart and also for a host of so-called "uterine" symptoms. Yet these very symptoms may be due wholly to nerve exhaustion or malnutrition of nerve centers and not to reflex or to direct action, from some real or some supposed uterine disorder. I say this advisedly, because I, too, have thus erred and because hardly a day passes without my seeing cases of supposed uterine disease which have been treated for months—even for years—when the whole trouble, or the most of it, lies not in the reproductive organs, but in the nerve ganglia. This abuse of uterine treatment through a mistaken diagnosis is, in my opinion, the great medical error of the day. Many of such mistakes of attributing too much to the reproductive apparatus have I seen in the practice of other physicians, but my own blunders in the same direction have made me feel very charitable toward them.

Very fortunately the idea attached to this group of symptoms (neurasthenia), is that the womb is at fault. A moral rape (this is too strong an expression, defluoration would be sufficient) is therefore committed by a digital or speculum examination and two supposed lesions will be found, first as

a matter of course, the natural virginal anteflexion, and secondly a slight uterine catarrh. They are at once seized upon as the prime factor and the patient accordingly subjected to a painful, humiliating treatment for false flexion and sham endometritis. Unimproved, she drags herself from one consulting room to another and finally in despair she settles down to a sofa in a darkened room and becomes either the spoiled pet or the vampire of the family. The same views had been expressed earlier by Van Deusen, who pointed out the evils of local treatment alone. Neurasthenia, according to Beard and Van Deusen, is a state which destroys the balance between waste and repair from nerve tire. Study of the phenomena of fatigue have extended these views. Pathogeny of this neurosis consists essentially in fatigue of the central nervous system through which its inhibitory influence on an excessive action of the local nervous system of the various organs and structures is checked, resulting in increased activity of the latter and their subsequent exhaustion.

The conditions underlying fatigue which produce neurasthenia are those which disturb the balance of the organism and thus interfere with waste and repair passing through a reversal of the law of evolution, and from the coherent heterogeneous to a lower type with increased expenditure of force. Every new mode of action of the bodily mechanism gives it, as Cowles says, a functional disposition to repeat the organic process. This, under the law of use and habit, constitutes the law of habit which prevails in all bodily and mental activities of the mechanism, and has a physiological basis. This law works with equal force in fixing a disposition to repeat disordered actions. The law of habit is fundamental to that of association, apparent in all activities, its processes being inhibitions. The higher inhibitory control in the ideational procases manifests itself through the attention, which is closely related to the motor apparatus; in its natural form attention being spontaneous or reflex. In the highest development of inhibitory power it is under the direction of the will and acts as voluntary attention. Among the earliest indications of fatigue and exhaustion of mental activities is weakening of

the inhibitory and directing power of voluntary attention. The mechanism thus constituted and subject to certain laws that regulate its activity under due control has an indwelling motive force. The energy of muscle and nerve comes into play under the physiological law of storage and expenditure, according to the fundamental law of all cell activity. Rest, sleep and nutrition contribute to the building up of complex cell compounds subject to physical and chemic laws, and the discharge of energy is accompanied by destructive chemic changes that yield toxic waste products, these processes occurring in both peripheral and central mechanisms.

The mechanism, when put into continuous use under the foregoing conditions, does not go on indefinitely upon being stimulated into activity, but manifests the phenomena of fatigue when subjected to prolonged exercise. The results of such use within proper limits may be regarded as normal. This is wholesome and power is gained in accordance with the law of physiological use, harmful results from disuse or over-exertion constituting conditions of pathological fatigue.

Normal use with normal fatigue of both the peripheral and central mechanisms are inseparably accompanied by chemic changes in the parts exercised, and toxic products are formed in the tissues. The effects of fatigue can be studied only as including the direct results of the discharge of energy plus the toxic influence of the products of cell activity, which emphasize and partly produce the fatigue of exhaustion. These elements exist in various proportions and under varying conditions. As between peripheral and central mechanisms, fatigue in one will produce its phenomena in the other, the blood being the carrier not merely of nutritive material, but likewise of toxic elements from one part to another.

In the normal mechanism under normal use is maintained the balance of waste and repair. Healthy activity is sustained by the removal of the autogenous waste products and the supply of nutritive material under due conditions of rest and sleep. In studying the processes that produce the phenomena of fatigue and the graver degree, exhaustion, certain factors must always be kept in mind as possible in operation. Two of

them are positive, viz., the direct result of discharge of specific cell energy and the reinforcing effect of the toxic products of tissue activity. The other two are negative, viz., with the holding of nutritive material in the circulating medium and the presence of toxic material in it which lessens the power of assimilation in the tissues.

Neurasthenia owes its peculiar mental complexion to the disturbances of the balance constituting consciousness. Neurasthenia causes disturbances of the co-ordination constituting the ego, which, as Kiernan remarks, oscillates between perfect unity, absolute incoordination, and the intermediate degrees, without line of demarcation between normal and abnormal, health and disease, the one trenching upon the other, or else it ceases to be. The "ego" is the cohesion for a given time of clear states of consciousness, accompanied by others less clear and by physiologic states which, though not entering into consciousness, are even more effective than the conscious states.

Certain cortical areas exclusively conected with the associating tracts have little if any direct connection with the bodily periphery. Such cortical areas and subsidiary associating tracts, bound into the higher unity of the cerebral hemispheres, constitute the material substratum of the "ego." Disturbance of the intricate relations involved in this is necessarily accompanied by disturbance of the "ego," or may render an "ego" impossible. On accurate connection of projection areas (passing outward to the periphery) with projection areas, and of these with "abstraction" areas, the faculty of logical corelation depends. Correction of the countless errors made during a lifetime is possible only by inhibitions, exercised by the association fasciculi. Correction with approaching maturity is delegated to the "abstraction" field, whose functions are ordinarily performed in an automatic manner.

Fatigue and other constitutional disturbances break up the associations constituting automatism. The individual then becomes actively conscious of the necessity of controlling conceptions constantly received from sense impressions. The factor assumed to secure balance between associations is termed will or volition. This final act of consciousness results from

a complex coordination of states, conscious, subconscious, or unconscious (purely physiologic), finding expression in action or in inhibition. Volition is an effect, not a cause.

The action of the heart, lungs or other organs registered in the unconscious phases of the "ego" does not normally form a conscious basis of mental states. Their disturbed action, destroying inhibitions, relegating them to the unconscious, raises them into the subconscious sufficiently to disturb the "ego," thereby creating states of anxiety, doubt, introspection, and their emotional consequences.

These occur at first during sleep at the time of the lowest systemic vitality, producing the distressing dreams which so often precede the phobias and obsessions of neurasthenia. The dream impression is sometimes so vivid that a hyponogogic hallucinatory process remains in consciousness, often forming later a vague delusional or false memory.

Through the rhythmic law of the nervous system, circular neurasthenia, with its alteration of emotional depression and exaltation, often appears without external cause. Suppression of the exaltation phase produces hypomelancholia; of the depression, hypomania.

Disturbances of the automatic inhibitions permit the trivial, the immodest, the occult and the criminal to rise into consciousness, whence the obsessions and phobias of neurasthenia. Of these there are two classes—the besetting and the impulsive. The first appears in conditions like the prying tendency into the trivial, or "grubelsucht" of the Germans; the last in homicidal, suicidal, nymphomaniac, kleptomaniac, pyromaniac and allied impulses.

From introspection and subconsciousness of organic disturbance comes the nosophobia of the neurasthenic. Nosophobia is too often brutally regaraded as feigned hypochondriasis without reference to its underlying factor. Nosophobia differs from hypochondriasis in being a fear of a disease rather than a belief in its existence; it is hence more terrifying than hypochondriasis.

Nosophobia takes a special direction according as the quack consulted has an alcoholophobiac, pseudoreligious, tox-

icophobiac, psoric, "sexual purity," testicular, uterine, "canal-opath," myopath, osteopath, cylinder, catarrh, kidney, vermicular, or reflex bias. The neurasthenic is peculiarly liable to suggestion, whence the crowds which were "cured" by Valentine Greatrakes (in the seventeenth century), as they are "cured" by Mother Eddy now.

Introspection through its numerous morbid resultants rising into consciousness inhibits symbolization, whence neurasthenic logorrhea. This is a word-diarrhoea with decided constipation of ideas. Logorrhea is not necessarily abnormal, since it often appears during medical discussions. Neurasthenic logorrhea often takes the direction of nagging.

Transitions from the obsession to the delusion, while not frequent, may occur when, by destruction of normal associations, the obsession no longer seems abnormal. Generally when mental breakdown is as complete as this it culminates in acute confusional insanity, the "verwirrheit" of the Germans. Exceptionally typomania or Bell's disease is produced. Sometimes a prolonged stuperous type results. True stupor may occur from extreme interaction of inhibitions. Neurasthenia in childhood produces casual visual and other hallucinations more frequently than neurasthenia of the adult because of inability to distinguish between the subjective suggestion and the objective fact.

Neurasthenia between the age of six and twelve, when the first signs of maturity (the permanent teeth), appear, often precipitates the onset of the mental state of puberty and adolescence. In this, religiosity, undue conscientiousness, undue sexual consciousness, introspection, and nosophobia normally tend to appear.

During puberty and adolescence there is normally a struggle for existence between the cerebral and the reproductive system which tends to obtrude subconscious states upon consciousness.

From this struggle results a fear of the unknown which produces suspicional tendencies and pessimism. Suspicional tendencies and pessimism, with which they are so often associated, arise from states of anxiety resultant on instability

of association, dependent on lack of non-use of association fibers. Pessimism, as Megalhaes has shown, is a state of nervous instability with alternations of irritability and prostration. The subject is supersensitive, impressions called forth are intense, and, causing prolonged reactions, are followed by exhaustion. The state is characterized by a general hyperesthesia, which naturally results in an excess of suffering. From instability and hyperesthesia result discord between feelings themselves, between the feelings and the intelligence, between the lungs, the ideas and volitions. Discord between the feelings shows itself in a great variety of paradoxes, contradictions and inconsistencies. To the pessimist, possession of a desired object does not atone for former privation. Pain or unsatisfied desire is replaced by the pain of ennui. With inability to enjoy what he has are coupled extravagant expectations regarding that which he does not have. He is extremely susceptible both to kindness and contempt. He passes suddenly from irritability to languor, and from self-confidence and vanity to extreme self-abasement. This intense sensitiveness results in intellectual instability, since it involves a great vivacity of the intuitive imagination, which favors the setting up of extravagant ideals lacking in solid representative elements. Hence a gap opens between his ideal and the actual. He can never realize the ideal he pursues, and so his feelings are of a somber hue. From this excessive realism results a state of doubt, a certain distrust of all rational objective knowledge, expressed in occult fear and belief. It assumes another form in extreme subjectivism. The pessimist is haunted by images of the tiniest religious scruples, suspicions, fears and anxieties resultant in alienation from friends, seclusion, misanthropy. He has an incapacity for prolonged attention, a refractory attention, and a feeble will. These result in inaction, quietism, reverie, self-abnegation, abolition of the personality, annihilation of the will, amounting sometimes even to poetic or religious ecstacy. Pessimism is frequently associated with a morbid fear of death (thanatophobia).

Neurasthenia tinges the mental state of puberty and adoles-

cence with undue egotism, when the unpleasant obtrusiveness of what is called sexual neurasthenia. This is generally the morbid survival of the adolescent mental state after adolescence. Hebephrenia may result, with its intense vanity, extreme selfishness, religiousity and perverted ethics, aural and visual hallucinations, shallow emotionalism and violent but controllable impulses.

Lust of the algophiliac type, which seeks satisfaction in pain (whether in cruelty toward others or in self-mutilation), often occurs prematurely between six and twelve or during adolescence. This may arise from congenital deficiency of power to acquire that secondary "ego" best expressed by the Golden Rule, or from that decay of the secondary "ego" which neurasthenia, like other protracted invalidisms, occasions.

Neurasthenia, during periods of involution like the climacteric and senility is marked temporarily by the mental characteristics of the period, followed or not by permanent mental breakdown. Climacteric neurasthenia, whether the climacteric be expressed in man by prostatic change or in woman by the menopause, presents the psychic features of ordinary neurasthenia plus sexo-emotionality. This is likewise true of senile, neurasthenia; the miserliness, collectivism, eroticism etc., of old age may temporarily appear during it.

Neurasthenia in a degenerate (properly speaking, a hereditarily tainted defective), is accompanied by persistent obsessions of the besetting or the impulsive type. In such subjects circular neurasthenia may become periodic and circular insanity. Neurasthenia may precipitate paranoia in hereditarily tainted subjects of seemingly sound mentality.

Neurasthenia resultant on or complicated by phthisis has the suspicional capriciousness of the tuberculous. The same type of mentality occurs with uncompensated cardiac disease.

Neurasthenia produced by alcoholism or accompanied by it has the morbid jealousy, fear of poisoning and ideas about morbid sexual manipulation which characterize alcoholism.

Neurasthenics who have been exposed to syphilis, or believe they have been, have as the dominant note of their mentality syphilophobia.

Neurasthenia due to sunstroke, traumatism, lightning, or electricity, tends to develop suspicional mental states which very frequently form the basis of a secondary paranoia culminating in paretic dementia from extension of meningitic processes to the cortex. Exceptionally similar states are produced by the protracted nervous adynamia resultant on typhus and allied fevers.

The mental state of most pregnant women is essentially that of mild neurasthenia of the circular type. The so-called "longings" are besetting and impulsive types of obsessions Phobias usually take the type of fear "marking" the fetus. Pregnancy introduces a new force into woman's organization which disturbs the physiologic balance previously existing. Hence, strictly speaking, so far as the woman is concerned. is a pathologic, albeit not a nosologic state.

The psychology of neurasthenia expresses the nature and extent of a disturbance of the normal "ego" due to the influence of nerve tire primarily on the central nervous system; secondarily, through resultant uncontrolled action and its consequences on the nerve systems of the organs.

While nerve tire does not create organic changes, save in very few cases, and then only when assisted by toxic conditions, still nerve tire produces neurasthenic mimicries of every constitutional disorder, particularly of the eye, ear, nose, throat, gastro-intestinal, renal, hepatic and genito-urinary tracts. What Goodell says concerning the utero-ovarian region, is equally true of the pelvis in the male. Nerve exhaustion of necessity must affect the nose and throat for similar reasons that it affects the genitals. The erectile tissue of the nose and the throat was once closely associated with the genitals. As all erectile tissue implies a complicated nerve control, nerve tire easily produces various ear, nose and throat phenomena ascribed to "catarrh." The myriad types of so-called hay fever are an illustration of this. A respiratory neurosis which occurs very frequently in men and women about forty-five and after sixty, which is characterized by dyspnea varying from puffiness resembling the "air hunger of autotoxemia to true asthma with its peculiar expectora-

tion and crystals, is often a manifestation of nerve exhaustion. This last type may, through the periodic tendency of the nervous system, become true asthma. Accompanying these respiratory disturbances are sometimes experienced the sensations of organ displacement so often regarded as the first stage of Glenard's disease. These occasionally result from disturbed organ innervation arising from nerve tire merging into consciousness. They are not evidences in the early stages of organ displacement so much as evidence of a loss of balance, which disturbs organ orientation and creates states of anxiety. The older alienists suggested that such disturbances lay behind the displacement of the colon so frequently noticed in protracted melancholia. One phase of this organ disturbance arising from cardiac nerve tire is the heart pain and sense of weakness in neurasthenics which so closely resembles angina pectoris. This pain, which has been called pseudo-angina, is as fatal as the true angina pectoris, and bears the same relation as neurasthenic asthma does to fully developed asthma. Similar phenomena occur temporarily in a congerie of symptoms resembling exophthalmic goitre, and bearing the same relation to that disorder as the asthma and angina do to the fully developed conditions. Neurasthenia may be complicated by and complicate everyone of the organic disorders, and then neither the neurasthenia nor the organic disease can be neglected.

The treatment of neurasthenia is marred by the usual quackeries which fix upon a single symptom as the disease. The drugs generally prescribed for their tonic effect are, as Bremer observes, nux vomica or its alkaloids, arsenic, phosphorus, quinine, bromides, iron, hypophosphites, etc. None of these remedies will cure. Iron is particularly objectionable, as it is, as a rule, not well borne by the neurasthenic. Quinine if often administered in excessive doses for the erroneously supposed complication of malarial infection. There is no drug (and I say this after careful and long observation), which can restore or create nerve strength and brain vigor, as is so often claimed by proprietary medicine men. The majority of the much advertised nerve tonics are not worth

trial. But these articles are in great vogue owing to recommendations of mistaken physicians in good standing. The thousands of barrels of "nerve tonics" taken annually mean misery to untold numbers of neurasthenics and their families, since such patients, when poor, consider it of greater importance to buy their "nerve tonics" at the rate of $1.00 a bottle than provide necessities for the family. The drug prescription errors are complicated errors involving exercise and diet. One of the commonest and most disastrous prescriptions given to the neurasthenic is, as Bremer remarks, "Take plenty of fresh air exercise." The "fresh" part of the injunction is all right (in some sanitariums such patients are often compelled to be in the open air all day, even though in bed and when too weak to move about or sit up), but the prescription of "exercise" is all wrong. There is a widespread delusion that exercise is beneficial under all circumstances. The acme is reached when the gymnasium and athletics is recommended to all neurasthenics. Many athletes and prize fighters become neurasthenic by dint of too much muscular exercise. Even in laboring men who have heavy work to perform, nervous prostration often results. Whenever and as often as a muscle is contracted certain brain cells enter into activity. The brain in one or more of its parts is, in neurasthenia, easiest irritated and exhausted. Owing to the close functional dependence and interdependence of all parts of the brain, work of the motor region governing muscle contraction during exercise must redound on other weakened and easily irritable parts. Some cerebrasthenics whose slightest mental effort is followed by brain-fag can walk long distances without feeling any fatigue, but this is often an expression of over-fatigue.

Dietetics are also badly abused. Neurasthenics are often advised to eat plenty of nourishing food and gorge themselves without considering that, as Bremer remarks, it is not the amount of nutriment, even when properly digested and absorbed, which determines nutrition, but the use to which the digested food can be put into tissues. The artificial foods have the effect of weakening the stomach by rendering it, so

to speak, apathetic, thus interfering with the churning of the food and the secretion of gastric juice. An ounce of butter and bread digested naturally outweighs a pound of beef incorporated in the system under artificial conditions. Beef extracts are especially objectionable in neurasthenics. Milk and fresh fruit often disagree with these patients. Dietetics, therefore, should be a matter of individual prescription, rather than any general directions. Excess of the proteids and excess of the starches and sugars are equally to be avoided, as the two excesses, acting in a vicious circle, aggravate each other. Starchy food fermenting in the intestine causes absorption of proteid products of decomposition.

The general principles of treatment consist in educating the patient to live within his nerve income, which is small, The man of average strength cannot with impunity attempt to perform the muscular feats of an athlete or prize fighter. Likewise the neurasthenic cannot do what many of his acquaintances do. He must forego a great many pleasures; abstain from many pastimes and entertainments; refrain from many articles of food which to him seem simple, natural and healthful, but nevertheless stand in the way of his recovery. He must, above all, learn his limits. His treatment must be a sort of education, teaching him to be patient and temperate in all things. He must learn to adapt himself to his surroundings, to re-establish the lost normal equilibrium between him as an individual and his environment. To mitigate is not to prevent the collapse which constitutes such a discouraging feature in the course and progress of neurasthenia, discouraging alike to patient and to the family. To achieve this end the patient must be taught to avoid extremes, especially of emotional and work, mental or physical; in short, bodily and mental hygiene adapted to his individuality must be instituted. No rest cure, no seaside gymnastics, cold or warm water; in fact, no particular method, and least of all drugs, will bring about restoration to health.

The pre-eminent conclusion from these principles is that the patient should be under the control of a physician and during treatment should be severed from the environ-

ment in which the disorder has grown up. He should receive diet, hydrotherapy and balneotherapy indicated only in his particular case. The great results formerly attained at watering places were due to the partial application of these principles, and to the medical control exercised. No rest cure is properly carried out where these principles are neglected. Rest cures under lay control, whether of trained nurses or otherwise, are simply quackish lounging places. That the training of a widely advertised system of rest cure is eminently deficient is shown in the fact that nurses trained under this system never detected the untoward actions of drugs used in treatment until decades after their existence had been pointed out by neurologists.

DISCUSSION.

Dr. Albert E. Sterne, of Indianapolis, Ind.—Mr. President: The subject of neurasthenia is one of such far-reaching importance, not only on account of the immense number of sufferers from this condition—and I use the word condition advisedly, because I do not think it is a disease—that it ought to be carefully discussed, especially after a paper such as Dr. Butler has read, which takes a far-reaching view, and one which I can heartily endorse, so far as my personal views are concerned. Dr. Butler has not only brought up the question of neurasthenia being a pure nerve weakness, but he has also touched upon the characteristic interchangeability between the neurasthenic, namely, the border line between sanity and insanity. We must not term our neurasthenics insane, as so many are apt to do, and as so many true neurasthenics appeal to us. They are not insane, in the sense of the ordinary term. But they get into a condition of absolute mental weakness, which is not only commensurate with the condition of nerve weakness, but, as Dr. Butler has said, if there is a predisposing element in one direction, they positively create delusions almost like the insane state. Pure neurasthenia, pure nerve weakness, what Dr. Butler and others have called nerve tire, nerve fatigue, nerve fag, is that condition in which the nerve cells have lost their power to rest. If a nerve cell loses its power to rest, it is in a state of functional over-activity. This over-activity can be brought about in various ways; but its primary cause lies in the over-nutrition of the nerve cell itself, meaning thereby not that it is over-nourished, but that it receives a surplus of nutrition, circulatory filling, if I may use

such a term. It is a sort of cellular congestion which keeps the nerve cell in a state of activity, and I personally am an adherent of the idea that the cerebral cell has a certain power of motility. If this over-activity of the cell is in the motor region of the brain, and it can be confined to the motor area of the brain, we get symptoms from that side of the motor system, localized twitchings which fool or deceive the most expert neurologist sometimes. The localized symptoms in these cases pass away when the general run-down condition is overcome. Localized neurasthenia, for instance, is well seen in what is commonly called writer's cramp, and in the telegrapher's arm. The so-called occupation neuroses are an expression of localized neurasthenia. If this condition of cellular fatigue takes place in the so-called higher centers, we have symptoms from the higher centers. We find impaired judgment, impairment of memory, loss of sleep, an apprehensive state which appeals to us strongly as bordering upon insane conditions. We find this same localized condition in the visual centers, and we have impairment of vision. The same holds true with regard to the auditory centers. In other words, we can have localized brain fatigue. If we have localized fag in any portion of the brain, in adidtion to general nerve fatigue, we will have the symptoms that Dr. Butler has mentioned predominating in any one field. Very frequently we are dealing with a general neurasthenia rather than the accentuation of a general condition in one particular field.

I was very much gratified to hear Dr. Butler take such a broad standpoint. He has covered it, to my mind, better than I have heard it covered for a long, long time, if ever before. It brings out what might be termed a dangerous idea, namely, that neurasthenia lies on the borderland between actual sanity and actual insanity, but I do not believe Dr. Butler takes that position. I do not believe that myself. I think there is a vast difference between neurasthenia, *per se,* and such conditions as we speak of as the borderland mental states.

To speak of the treatment would take me too far, but I agree with him when he says that the multiplicity of drugs, the so-called nerve tonics, are absolutely worthless. What these patients need is restoration of lost nerve energy, and not a lot of stuff put into their stomachs, which are in the same debilitated condition as the rest of the system, and which adds to the debility rather than increases their strength. What they need is rest, and good common sense correction. They must be taught that they are not the only ones who are

suffering like that, and they must be disabused of the idea that nobody else ever suffered as badly from the condition as they do.

DR. FRANK P. NORBURY, of Jacksonville, Ill.—There is one question in regard to this subject which I would like to have had Dr. Butler enlarge upon, and that is as regards the diagnosis. One would seem to think that the diagnosis of neurasthenia is easy, but in my experience I have found, and doubtless it has been the experience of others, that the disease is diagnosticated almost wholly by exclusion. We have to find out what the patient has by what he has not. This was touched upon by Dr. Patrick in his remarks on the case previously reported, and it is a vital point in the diagnosis of this disease. I call it a disease, although it is a conglomeration; yet taken as a whole, it is a disease. We arrive at a diagnosis of it by exclusion. We meet with many cases that are said to be neurasthenia, which have certain nervous symptoms, on a well-defined physical basis, namely, some heart disease, some disease of the stomach, etc., which are not essentially cases of neurotic origin, neurosis of the stomach, heart or kidney, but are pure cases, due to some organic disease.

While we have symptoms of neurasthenia preceding mental disease, in many cases, yet there is a difference between the mental aspect of the case or the mental disease, and the mental symptoms of neurasthenia.

I do not know whether the statement made by Dr. Butler in regard to the question that neurasthenia may precipitate paranoia can be sustained, but I believe paranoia is essentially a degenerative condition, dependent upon inherent degenerative conditions, and neurasthenia is not necessarily of that origin. It may be acquired, although it has back of it, in the great majority of cases, a faulty family history; yet when it comes to the question of paranoia, I believe we are dealing with a disease that represents nature's waste pile, the question of elimination of defective mental conditions.

DR. JOHN PUNTON, of Kansas City Mo.—I enjoyed the paper very much indeed, and, like the rest of the speakers, I think the essayist has covered a very important field. It seems to me, the great mistake in the diagnosis of neurasthenia lies in the fact that the majority of practitioners fail to recognize that they are dealing with a generalized nervous affection; but often made manifest in a localized manner, and as a result of this local manifestation, many times the effect

of the cause is treated instead of the cause, and as a result a wrong diagnosis is made in many instances, hence the treatment instituted is faulty. I think that when we remember it is a generalized affection, with local manifestations, we can see how tremendous the range of its symptomatology becomes.

In fact, there is no function of the nervous system which is not, at times, more or less involved in the process, and as a result of this we get a multiplicity of symptoms which are exceedingly misleading to the average practitioner. As a consequence, the treament is not only faulty, but followed in many cases by failure.

Dr. Butler has touched on broad lines in recognizing the complications which arise in connection with neurasthenia. We cannot afford to ignore the close relation that exists, at times, between neurasthenia and insanity. For the life of me, I cannot understand where we can draw the line, in cases where we have marked delusions upon a neurasthenic basis. If we regard the case as one of insanity, then, of course, it ceases to be neurasthenia. If, however, we recognize it as belonging to true neurasthenia, then it is not true insanity. As a matter of fact, in a number of cases the psychical element is the predominating one, and as a result we get delusions, and these at times are fixed, which simulate the insane state. I am inclined to believe that, at times, the line of damarcation is so dimly drawn that it is difficult to tell whether we are dealing with true insanity or with a functional neurosis which is recognized as neurasthenia.

Dr. Butler (closing the discussion).—I have nothing in particular to say in answer to the remarks of the gentlemen who have spoken, other than to say that, in my opinion, there is no disease which is so difficult to diagnose as neurasthenia, and particularly if the disease is complicated either with hysteria or some obscure organic trouble. Of course, it is necessary to make a correct diagnosis, if possible, but so far as I know, there is no ordinance which prevents a man from having neurasthenia with organic disease, and if we can cure the organic disease, we may improve the neurasthenia. I verily believe that neurasthenia may precipitate paranoia, may hasten its development, and that a person, in suffering from neurasthenia, may not possibly have this disease, or it may be delayed for some considerable time.

XXXI.—THE CRIMINAL RESPONSIBILITY OF THE EPILEPTIC.

BY JOHN PUNTON, M. D.,
KANSAS CITY, MO.

The intricate problems associated with epilepsy appeal at times to both law and medicine for their intelligent solution. By virtue of its extreme antiquity and vital importance to the well-being of all classes of society, epilepsy also challenges the interest and attention of every loyal citizen. Long before the Christian era it was recognized as the Herculean disease, not simply because Hercules was subject to epileptic attacks, but on account, as Galen says, of its extreme severity and magnitude. Notwithstanding the fact that Hippocrates described its purely objective physical phenomena with charactertistic accuracy, yet the knowledge the ancients possessed of the actual nature of epilepsy reveals a sad mixture of ignorance and superstition combined, bordering on barbarism. Since the days of Hippocrates every century has borne in its medical literature conspicuous accounts of its mysterious manifestations—hence for over twenty centuries epilepsy has passed among men as a something too intangible to explain by any known law or process, and far beyond the scope and power of any therapeutic measure so far devised to arrest its pernicious effects upon the brain and other organs of the body in but very few of its numerous victims.

In the past twenty years, however, more actual progress has taken place in our definite knowledge concerning its true nature and character than in all the preceding centuries, and it is to this particular period that we are indebted for much of the information that supplies our text and that which we desire more particularly to emphasize. In order to fully realize what has been accomplished in this epoch-making period, it is necessary at the outset that we study carefully the historical data associated with the gradual evolution from a series of extravagant and absurd hypothetical conclusions and superstitious beliefs to that of a regular succession of well established scientific facts relating to the true nature and character of epilepsy.

Time forbids even a brief reference to the former, nor is it necessary, as the literature upon the subject is well known to all of you, but this paper would be manifestly incomplete if it failed to mention the leading features that rescued epilepsy from the domain of purely theoretical speculation and placed its study upon a more secure and accurate scientific foundation.

Prior to the celebrated dissections of Gall at the beginning of the 19th century the principal idea that obtained in regard to the brain by anatomists, and other scientists, was that of a semi-structureless mass exhibiting certain constant ganglia, such as the striated bodies, the optic thalami, the quadrigeminal bodies and the pineal gland, but on the whole as a *single organ* or unit rather than as a *group of organs.* By an elaborate series of experiments and observations, Gall formulated a theory of his own concerning the brain and its functions, which was recognized as a decided departure from any then extant. Its essence consisted in the recognition of the brain as a multiform organ that is composed of a number of nervous centers or organs, each endowed with special functions. This remarkable theory had the effect of startling the entire medical world and the facts to which it appealed were severely criticized and wholly rejected by the then recognized scientific men. For instance, no less a personage than Sir Charles Bell termed it "The most extravagant departure from all the legitimate modes of reasoning." Flourens, the French physiologist, also bitterly opposed it and was the first to undertake to prove its fallacy from a scientific standpoint. In 1822 he made the announcement before the French Academy of Medicine that Gall's theory was greatly misleading and by a brilliant series of experiments undertook to prove to his audience that the brain was not a multiform organ, but that it acted as a whole and was single in its constitution, its several parts not possessing distinct functions. It is unnecessary to burden you with later investigation. Suffice it to say that when Hood and Bouilland a few years later demonstrated that disturbances of speech were always accompanied by disease of the frontal lobes of the brain; when Broca in 1861 undertook

to definitely locate the speech area, and when in 1862 Hughlings Jackson, of London, and Meznert, of Germany, simultaneously announced to their respective medical societies that the anterior portion of the brain was concerned chiefly in motor acts, the former reaching his conclusions from the study of localized spasms and the latter from the observations of the lesions of general paralysis, it was very clear to all that Flourens' teachings needed further confirmation; and in 1869 Fritch and Hitzig, of Berlin, undertook to verify it. Their conclusions proved beyond doubt the fallacy of Flourens' monistic theory of the brain, which were again verified by Ferrier in 1873, who also demonstrated that not only were the anterior lobes of the brain chiefly concerned in motor acts, but also the posterior portion was largely sensory in character, besides defining each special sense to a definite region of the brain. Thus the doctrine so vigorously taught by Flourens and believed by the great mass of medical men became wholly untenable and the original views advanced by Gall, and so ably supported by Broca, Hughlings Jackson, Fritsch, Hitzig, Ferrier, Hersley, Gowers, Schaffner, and within the last decade by our own Dana, Starr, Sachs, Dercum, Mills, Berkley, Collins, Hammond, Mitchell, and a host of others, was fully proven and today reigns supreme, constituting the science of cerebral localization.

Now, upon the recognition of this science and the facts to which it appeals hinges our modern medical conception of epilepsy. Your attention has therefore been purposely directed to this brief summary of historical data because when Hughlings Jackson, in 1873, advanced the theory to the effect that in epileptic attacks the cells of the cerebral cortex undergo explosive discharges he unconsciously defined the line of demarcation between empiricism on the one hand and scientific truth on the other in the study of epilepsy. Late investigation, both clinical and pathological, proves conclusively that epilepsy is essentially a symptom of brain disease confined chiefly, if not altogether, to the cortical cells of the cerebrum. In order, therefore, to fully comprehend what the term epilepsy implies presupposes a thorough knowledge of the struc-

ture and functions of the brain, as well as the nature and character of the lesions causing their derangement. As a primary proposition, therefore, and that to which all others refer, (more especially where crime has been committed by an epileptic) is the extent to which the brain and its functions are impaired by the pernicious influence of the prevailing epilepsy or how far this interferes with the individual's power of self-control. This at once raises the question of the mental responsibility of the accused epileptic. Now, the correct solution of this problem involves questions of the highest medico-legal importance and at times transcends in complexity all other questions with which expert testimony has to deal.

From a purely medical standpoint, however, the expert must of necessity pay especial attention in every case to its pathogenesis, besides recognizing the true significance of certain etiologic as well as pathologic factors associated with the various manifestations of epilepsy. Recognizing epilepsy as a symptom of some brain disease, we also know that it may occur from various causes both congenital and acquired, but its chief etiological factor, and that which is now universally held is, that its presence is largely due to hereditary defects or some faulty inheritance. Theorize, criticize or philosophize as we may concerning it, nevertheless the law of heredity is as potent to-day in the moulding of human character and shaping destiny as it was in the days of the patriarchs, and its close relation to epilepsy cannot consistently be ignored. Time forbids further enlargement upon the great significance which this one element alone furnishes us in explanation of the pathogenesis of epilepsy. Suffice it to say that faulty inheritance is the responsible agent for many of the strange vagaries seen in epilepsy, and which at times culminate in actual mental alienation.

From the foregoing it is clear that epilepsy presents itself in various forms that render it subject to classification. Hence idiopathic or ordinary epilepsy is seen clinically in three rather distinct types of attacks:

(I.) Those which present both tonic and clonic spasms and quite severe in their character are known as grand mal. (II.)

The less severe or minor attacks constitute petit mal, while the (III.) larvated form or psychical epilepsy is characterized by various mental and physical automatic states. In addition to these, (IV.) Jacksonian epilepsy is recognized by the periodic character of the convulsions, which are of a primary local nature, and often unattended with loss of consciousness. (V.) Symptomatic epilepsy is a form due to gross organic changes in the brain, producing periodic convulsive attacks. In addition to those cases due to trauma, epilepsy also occurs in connection with other diseases, such as hystero-epilepsy, syphilis and alcohol, besides the acute infections, but there are no special forms other than those mentioned arising from these complications. As already remarked, the most frequent result of epilepsy is mental deterioration, which sometimes amounts to true insanity. All authorities agree that epileptic convulsions, when long continued, in some degree at least impair the mental faculties, and that this mental weakness presents all degrees from a mere dulling of the emotions, sensibilities and will power to an absolute loss of all these amounting to true dementia. The amount of mental failure, however, varies greatly in different individuals and is not always dependent upon the duration of the epilepsy. It is even claimed that epilepsy and great mental strength, amounting to intellectual genius, are not incompatible; and while this, in part, may be true, yet in such cases it must be confessed that this is rare and exceptional and the attacks are usually of a mild or transitory character. Hence the validity of universal medical experience, *viz*: That well established epilepsy is a sure sign of biological inferiority still remains intact.

By virtue of its complicated nature, however, epilepsy becomes a common and convenient plea of defense for crime, hence the mental responsibility of an epileptic has become one of the most momentous medico-legal questions of the day and we, as the exponents of medical science, are called upon to assist the authority of law in meting out justice when epilepsy becomes associated with crime, and more especially in case of murder. In assuming this dignified and lofty function we are called upon to consider not only the mental condition of

the accused epileptic, but also pass upon his responsibility for the crime. It is, therefore, at the outset important to remember that it would be manifestly improper to exonerate a criminal simply because he was subject to convulsions, equally culpable also to condemn because convincing symptoms of epileptic insanity had not been observed or proven.

In thus considering the mental condition of the epileptic, and especially his responsibility for criminal acts, we must therefore recognize the extent to which mind-control has been impaired by the epilepsy, as well as the existence of epileptic insanity. In case, for instance, where an epileptic has committed murder the problem to be solved is usually whether the accused was insane, and, if so, whether he knew the difference between right and wrong at the time he committed the deed. If he did, he is then, says the law of Missouri, mentally responsible for his crime, sane or insane, and his punishment is fixed by statute to be death on the gallows. Now, the legal aspect of insanity, whether it be epileptic or any other form, differs radically from the medical aspect, and because of this, gross injustice is sometimes allowed to pass for justice, even by those who would otherwise be just. Thus the insane criminal is sometimes convicted legally, but not medically, because he happened to know the deed he committed was wrong, besides being competent to relate all the details of the crime. Now, it would seem a useless expenditure and even waste of time for me to attempt to show the fallacy of this legal view of insanity, the essence of which recognizes no degree of the loss of the power of self-control. It is simply surprising, however, to find how few medical men (much less lawyers and jurymen) that believe an insane man may premeditate and plan a murder and after a varying length of time execute it with a marked degre of intelligence and cunning, and when arrested be able to explain all particulars in detail, beside acknowledging that he knew it to be *wrong* and in *violation* of the *law,* as well as recognize the stipulated penalty for such a crime, and yet in view of this be mentally irresponsible for his deed. Medical science and experience, however, teach us that all the details referred to *can be done*

by an insane man. Hence I contend that the legal test of mental responsibility when alone applied often miscarries the true specific purpose of meeting out justice to the criminal. As it stands today the test of criminal responsbility before our courts lies in the proof of the full possession of reason and free will; when both these are present the party is held responsible, when either is absent he is held not responsible.

Professor Ordronaux, of the Columbian College of Law, New York, says according to this legal definition, "By reason is meant an intelligent comprehension of the circumstances in the midst of which one is placed, and by free will is meant the power of doing or abstaining from doing a particular act or thing." Now, the opinions of competent medical men today are agreed the world over that many an insane criminal *knows right from wrong* and can often relate intelligently all the details of his crime beside plan and premeditate it, as well as seek to evade arrest, and yet at the same time be irresponsible for his actions. Those of you, however, who desire to study this phase of my subject more closely can do so by consulting "Taylor's Medical Jurisprudence," page 678, fourth edition, in which several such cases are cited, many of whom, however, were acquitted by the court, although they knew full well the quality and nature of their criminal act, thus recognizing right from wrong.

In dealing with the question of criminal responsibility it would seem that much of its complexity would be removed if the criminal code proposed by Mr. Justice Stephens,* of London, could be universally adopted in our courts of law. This appears to the writer not only fair, but just, and with its ruling every medical man can agree, for its substance proposes to make the individual's power of controlling his actions the real test of mental responsibility.

The justice of such a rule as this is clear, although its application requires extreme care and judicious discrimination.

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* "No act is a crime if the person who does it at the time when it is done is prevented either by defective mental power or by any disease affecting his mind from controlling his own conduct, unless the absence to control has been produced by his own default."—*Clouston Mental Diseases, page 428.*

More especially is this true when it pertains to the latter clause, in which provision is made for punishment in cases where the individual is responsible for his mental derangement. Your attention has already been called to the fact that epilepsy may be congenital or acquired, hence the importance of its etiology and the relation it bears at times to the crime is self evident. No one doubts, for instance, that syphilis and alcohol sometimes become potent factors in not only the causation of epilepsy, but also promote the homicidal acts of the epileptic. Hence the relation of these to criminal responsibility would seem to be plain, as these are matters of free choice and hence subject to individual will-power. In the majority of cases, however, of epileptic insanity the loss of power of self-control is so clear that it requires no special study to recognize its true relation, but occasionally there is a departure from the recognized principles which govern its diagnosis and it is more especially in these cases where medical testimony is liable to conflict and prove of no special value in solving the problem of criminal responsibility. In all such cases, however, even where the murder is known to be committed by an irresponsible epileptic, the law should be amended to allow its holding them *under rigid medical surveillance* for the rest of their lives. In this connection careful discrimination must be made between *punishment* on the one hand and *medical treatment* on the other. No insane criminal epileptic should be punished (as this term is commonly understood) unless his epilepsy was brought about by his own default, and even then his pitiable condition appeals to medicine more than to law.

Private medical opinion should not be subject to public sentiment unless the facts in the case are strictly in accord with the concensus of medical teaching and experience concerning the true nature of epilepsy. All authorities agree that irritability, impulsiveness and aversion to control are the marked characteristics of the epileptic psychosis, but even these unfortunate traits are subject to discipline by proper and appropriate medical treatment. In true epileptic mania the criminal act is usually unpremeditated, motiveless and

accompanied by impairment of consciousness and temporary loss of memory. Conscious anger in an epileptic should therefore be distinguished from true epileptic mania. Time forbids further enlargement upon the special characteristics of epileptic insanity. Suffice it to say that all authorities recognize that homicide is its legitimate product and much leniency should be allowed in every case where murder is committed by one who is known to be subject to true epileptic paroxysms.

As a remedy for the present unsatisfactory method of securing expert medical testimony the question of the mental responsibility of the epileptic should be decided by an impartial medical commission, appointed by the court, which again may be referred to the local medical societies to name its members; and their examination should be made and report returned to the court prior to the trial and wholly independent of the lawyers engaged in the trial. Suitable compensation for such service shauld also be allowed by a fixed statutory law. In conclusion, it would seem that the following deductions are admissable:

First—That epilepsy is a symptom of some brain disease.

Second—That its continual presence tends toward mental deterioration.

Third—That the mental responsibility of the epileptic depends upon the extent to which mind or self-control has been impaired by the epilepsy.

Fourth—That the legal test of insanity is not sufficient, as mental irresponsibility is not incompatible with a knowledge of right from wrong.

Fifth—That epileptics are to some degree at least responsible for criminal acts, more especially when the epilepsy is produced by their own default.

Sixth—That criminal acts of epileptics appeal to medicine rather than law for their proper adjudication.

Seventh—That in all cases of murder where epilepsy is proven the law should be amended to allow of life commitment to an insane hospital, rather than to the penitentiary.

Eighth—That the mental responsibility of the epileptic in

case of murder should be referred to a medical commission, appointed by the court, which again may be referred to local or county medical societies to name its members.

If I have succeeded in calling your attention to a subject which demands our most earnest and serious attention, the object in presenting this paper will have been accomplished.

DISCUSSION.

DR. W. B. FLETCHER, of Indianapolis, Ind.—Mr. President: I think this subject too important to be discussed too hastily, as it would necessarily be at this time of the day, and I think it would be an injustice to the writer of the paper to pass it over in a very informal manner. It is a most important subject, indeed, one that touches all of us when we are called upon as experts in such cases, and as every physician is at some time or other, I think. The suggestions are excellent, but I believe the paper ought to be more fully discussed than is possible at this late hour of the day.

DR. H. M. BEAVER, of Spring Hill, Kan.—I was very much interested in Dr. Punton's paper, and it is one that ought to bring out a good deal of discussion. It is a question of paramount importance, on account of the deplorable condition many of these patients are in, and oftentimes when they are brought into court they are placed in a very pitiable position.

One of the most important points Dr. Punton made was in regard to the matter of criminal liability, stating that it should be referred to a commission composed of local health officers or members of local medical socities, let them pass upon the case, and present their views to the judge to read, and let him make the suggestions to the court. It sometimes happens that the testimony given by physicians during their examinations and cross-examinations as experts or special witnesses is ignored entirely, so that the effect upon the jury is completely lost. I believe the law should be amended with reference to expert medical testimony, and that competent medical men should be appointed to pass on such cases.

XXXII.—SUDDEN ATROPHIC INFLUENCE OF CRANIO-SPINAL NERVES, WITH REPORT OF A CASE IN QUESTION.

BY F. E. COULTER, M. D.,

OMAHA, NEB.

History of Case.

The following case was admitted to the in-patient department of the National Hospital, Queen Square, London, Sept. 6, 1901, under the care of Sir Williams Gowers, F. R. S., by whose kind permission and suggestion it is recorded.

The following history was obtained from the mother:

The patient, L. C., was brought for treatment because of convulsive attacks during the past four months.

The father is a garden salesman, and enjoys good health, excepting for rheumatism and has had one attack of appendicitis; the mother is healthy, has had five living children, all in good health at the present time, excepting one that has "Constitutional Keratitis." She has had two miscarriages; the remainder of the family history is nil throughout.

Patient was a full term child, healthy at birth, and labor was normal. Always was nervous, but walked and talked at about two years. At fifteen months had an abscess behind left ear, but did not call a doctor and has been healthy ever since until twelve months ago, when she fell from a bed and injured her head, producing what a physician called a "slight concussion of the brain," but in two days was quite well, no paralysis or other trouble following.

One evening in May, 1901, suddenly became like a drunken man and staggered, eyes became fixed, followed by a convulsion that started in the left arm and leg, then soon extended to the right extremities and face. She foamed at the mouth, bit her tongue, passed urine and motions, and the attack lasted two days, during which time she was unconscious and fourteen hours of which she was convulsed more or less No loss of power followed, but she was very irritable and hard to manage, and her mental condition seemed altered.

Within three days of this time the hair came off entirely from a spot behind her left ear, and a day or so later that on the right side, same location, followed, so that the head was quite bald at these two patches within five days. The hair did not fall off *en masse*, but came away very rapidly, so

that within five days none remained on the regions described.

July 20, 1901, had a second convulsion which was very similar to the first, but was not so severe nor did it last so long. She has had no more attacks since, but is still more or less passionate and troublesome with other children, and is restless and "fussy" about herself, her disposition being altered in this regard from what it was before the attacks.

PHYSICAL EXAMINATION.

The child is found to be well developed and fairly nourished, with rather a stolid masculine expression and dark complexion. Speech is rather gruff and masculine, but normal, and she sleeps well.

Mental condition is not of a very hight order, but she is attentive and is not deficient in memory and is not emotional. Smell, taste and hearing are natural. Sight in right eye is about normal, but is unable to detect only slight light in left, cannot count fingers; by aid of the opthalmoscope, the right disc is found to be more pale than normal and the left shows evidences of congenital syphilis and atrophy of the disc and an old choroiditis together with pigmentations. Pupils are not equal in size, the right being the larger; they react to light and accommodation, the right better than the left, which is very slight. No strabismus or nystagmus was noted, but a slight ptosis of the left was detected.

The fifth cranial nerve was found to be normal, the seventh was possibly slightly weakened on the left as compared with the right, as the nasiolabial fold did not seem quite so deep on that side, yet it was not markedly altered. The ninth, tenth and twelfth cranial nerves were found to be normal.

No sensory alterations from the normal were found, either subjective or objective.

No change from the normal was detected in the motor system, all movements being good in range and power, and there was no wasting of any muscles; no spasticity, weakness, tremor, or inco-ordination was noted, other than might be compatible with perfectly normal conditions.

All reflexes, both the superficial and deep, were normal, No sphincter trouble present, and the cranium, spinal column,

heart, kidneys, lungs, etc., were normal. Gait was also normal, possibly a little deliberate, no Romberg sign present.

AREAS INVOLVED AND GENERAL CONDITION OF THE SCALP.

The areas involved are bilateral in distribution, the borders being well defined by the altered character of the hair, which will presently be described.

The shape of the two patches is similar, being almost an exact triangle, the base of which is formed by a horizontal line on a level with and including the external ear, the apex being directed upward and towards the vertex. In size they are about equal, the left perhaps being a trifle the larger. That on the right side measures from the base of the right ear (lobule), to the apex of the area involved, 4½ in. At

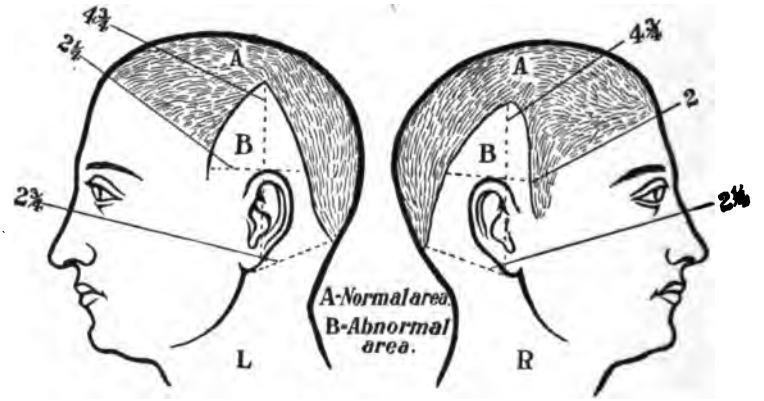

Fig. 1.

the top of the ear a horizontal line extending from one border to the opposite will be 2 in. in length, while the most posterior point from the base of the ear (lobule), is 2¼ in.

The figures of the left given in the same order as the right are 4½, 2½ and 2¾ in.

In shape and size these areas correspond anatomically so close to that portion of the small occipital nerve that is distributed to the scalp, that one may say without hesitation they are identical and the same, making slight allowance for anatomical variations.

A careful examination of the scalp reveals nothing ab-

normal, or of an unhealthy condition in any portion, all being of the same color and general appearance.

It would be impossible to distinguish the normal from the abnormal scalp by any ordinary method at one's command, for repeated observations in a good light, and under a lens, fails to demonstrate any difference between the two. At the time of this examination (four months after the convulsion), no sensory alterative can be noted in the scalp, and were it not for other evidence one would be tempted to doubt the history in the case bearing on this particular point.

APPEARANCE OF HAIR (MICROSCOPIC.)

The normal hair is of a very dark brown color, in fact almost a black, is coarse to the touch, and will measure about 2½ in. in length, or near that on an average, and has not been recently cut.

Fig. 2.—Normal Hair.

The hair found in the areas described is not more than half the length of the normal and also is quite irregular; it is markedly lighter in color, also finer and softer to the touch than the normal.

The difference is so well marked that the affected area is at once determined by the contrast in the character of the hair.

It is also apparent that this hair has never been cut. It sems to be quite evenly distributed over the areas involved.

APPEARANCE OF NORMAL HAIR (MICROSCOPIC).

All specimens secured from the scalp, when placed under the microscope, seemed in every way to be in a healthy condition. The bulbs seemed well rounded in shape, and regular in contour, and gave no evidence of inflammatory action, recent or remote; all seemed to be well nourished.

The stalk of each hair examined was regular and even, as well also the dark pigment which was found to extend from the bulb to the tip, the tip being well sealed and ovoid in shape. Evidently the stalks did not fracture readily, as no fractures were found on any of them, neither were there any bunches or protruberances to be seen. The diameter was very uniform from the bulb to the tip in each hair examined.

Minute fine globules, clear and glassy in appearance, but apparently oily in nature, were found distributed irregularly on the stalk; they varied as to number from two to five usually.

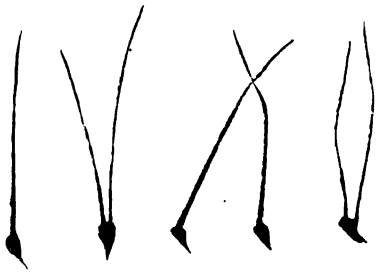

Fig. 3.—Abnormal Hair.

APPEARANCE OF ABNORMAL HAIR (MICROSCOPIC).

As has been previously stated, the hair found in the area described was not more than one-half the size of the normal either in length or diameter; this fact was most apparent, naturally, when a specimen was put under the microscope. The length was found, in some cases, to be more than 50 per cent. reduced, while the diameter was in about the same proportion at the base of the stock, and as one inspected the stalk it was very plain that at the apex the diameter was much less than half; in many instances the tip seemed to terminate in a long, sharp point, in marked contrast even with the base of the dwarfed production, not to mention the regular rounded nature of the normal hair. The bulbs were more

or less irregular in both shape and size, and at point of junction with stalk a right angle was in some instances found to exist. No evidence of a previous recent inflammatory action was found in any case and it was very evident that this hair had never been cut.

Repeatedly two stalks were found proceeding from one bulb; in some cases they were found growing side by side, and in others they seemed to be entwined for perhaps one-third of their length, one about the other. That these were not split hairs seemed apparent because of the difference in color, and because in no instance were they united only at the bulb; had they originally been of the same stalk, in some of the numerous specimens examined, about two dozen, a union would probably have been found in some cases existing above the bulb.

As to the intensity and distribution of the pigment it was most noticeable; only at the base of the stalk was the pigment so intense in color as to approach in any degree the normal specimen. As the stalk was examined from base to tip, the pigment became less and less in quantity until it was usually absent the last one-third to one-fourth of the distance from the base to tip. Also in that last portion of the stalk the absence of this pigment gave to that portion of the hair the appearance of a fine translucent fiber.

The pigment itself seemed similar in character and color to that found in the normal hair, the contrast being found in he distribution more than in the character of this substance.

These hairs also, as the normal, possessed the fine oily globules, but were less in number and were found located mostly nearer the base.

These abnormal hairs were not found fractured in any instance or splintered, but were bent in several instances and did not seem to possess an equal amount of resistance with the normal hair.

In looking over the literature at my command I find that a number of authentic cases are recorded in which, because of severe fright or mental anguish, the entire hair of the

scalp has changed color. In these cases the pigment has apparently been suddenly decolorized.

Sir William Gowers has made the suggestion that in these cases possibly there is formed, due to the unusual nervous influence, a liquid substance that is absorbed by the hair, and as it ascends the stalk decolorizes the normal pigment. Current literature abounds in many such examples, but few ever become the subject of careful scientific investigation. The same author, Gowers, reports a case of hemiplegia in which the beard up to the median line became white in a few days, while on the normal, the opposite side, it appeared darker near the median line than before the onset of the hemiplegia.

Other writers (Allchin 3) and (Gowers 2) have noted that at the seat of long continuous and severe pain, the nutrition of the hair in that region has been disturbed to such an extent that it became exceedingly brittle or would eventually die. The case just reported is unique in that certain areas supplied by particular nerves alone were affected and that during the time this nutritional alteration was in existence the patient was unconscious and hence entirely oblivious to the sense of pain throughout the entire body; also that the nutritional disturbances must have been very intense or the hair in the affected area would not have dropped out so soon and so completely.

CONCLUSIONS.

In view of the preceding observations it would seem conclusive that under certain conditions cranio-spinal nerves may exercise a sudden atrophic influence on the skin and the appendages thereof. That the results in the case reported are due to a disturbance of this nature, we think we are warranted in concluding because of the following reasons:

(*a*) All the hair was normal before the attack, but within three days after the attack all disappeared from the areas described.

(*b*) The character of the new hair is such as would be the natural product of a faulty nutrition (if due to the production of a toxine or the sudden diminution of the normal

elements is difficult to decide). We do know, however, that the normal hair is smaller in size, length and diameter, and markedly deficient in pigment substances.

(*c*) The fact that this was a bilateral lesion would naturally indicate that one was dealing with a blood condition, possibly a toxine formed by the very sudden and severe convulsive state, and manifested itself on this particular nerve trunk because of some histological character in its composition that we as yet are not able to detect.

(*e*) That in this particular case we did not have an example of that strange, yet interesting, condition of change in color, a decolorization of the hair seen after a very great fright or severe mental anguish, which in a short time changes the color of the hair completely, but instead a definite nutritive alteration acute in character.

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2. Gowers and Taylor Diseases of the Nervous System, second edition, page 404.
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XXXIII.—HEBEPHRENIA, OR INSANITIES OF CHILDHOOD.

BY WM. B. FLETCHER, M. D.,

INDIANAPOLIS, IND.

It has been a question with philosophers, metaphysicians and theologians for centuries as to whether or not a child could become insane. Some concluded a child was not sane until it had attained certain years, or a certain degree of education. Jurists have presumed to fix the period of sanity in children. I have known in one state of our Union where a child six years of age was hanged because he had killed his little sister and tried to hang her up as he had seen his father kill a pig a few days before. Any medical man who had given attention to the development of the human mind would aver that this was not the act of a criminal, but one of imitation. The ignorant child ol low type had no restraint

of conscience, for that attribute of the mind is one of cultivation, and not a gift of nature along with dentition. Neither was there evidence of insanity in the case, although if this child had been brought up by parents who either desired or were able to teach it that cruelty and murder were wicked and would be followed by punishment, and the child up to the time of the crime had been as conscientious as children of that age usually are, and suddenly changes its whole nature, then an alienist would say there was a case of insanity.

It would be impossible to fix a standard of age as to when a child is sane, or capable of self-government or ordinary self-control.

I think our judgment as to the sanity of children should be the same as that for adults, and was well expressed by Doctor Samuel Johnson when, in reply to a question asked by Boswell as to how he would define insanity: "Well," replied the old lexicographer, "if John Smith gets down on his knees at home, folds his hands, looks toward heaven, praying fervently, and does this several times each day, every one would think John Smith a sane and very devout man; but if John Smith changes his mind, goes out and performs the same devotions in the crowded Strand, or in front of Bow Bells, then John Smith is insane?" It is the deviation from recognized normal conduct, considering the civilization under which the individual has lived.

Strange to say, there is little to be found in medical literature about the insanities of childhood, and there are absolutely no statistics upon the subject anywhere. I think the reason lies in the fact that most cases that occur are not sent to hospitals or asylums for the treatment of mental disease, but, if the insanity is of mild type, the child is regarded by the parents as silly; if of violent type, it is a case of incorrigibility; and when the condition has become chronic, they are regarded as feeble-minded, and therefore, are more frequently found in juvenile reformatories, or schools for feeble-minded children.

I doubt if there is any physician who has practiced several years but can recall one or more cases of traumatic insanity;

insanity following meningitis, following ear disease in children particularly, will he be able to recall cases of transient delirium, hallucinations and melancholia from gastro-intestinal irritations.

I saw a little girl but a few weeks ago, who, without fever, "Had horrid dreams with her eyes wide open," as she expressed it. Snakes chased her, snakes surrounded her in bed, at school or at her play. After several months' active treatment by Christian Science doctors an old family physician gave her a big dose of calomel and had returns in the shape of a dozen or more lumbricoids, and the child has not seen visions nor dreamed dreams since. Indeed, most of the abnormal mental manifestations in childhood may be traced to the abdominal viscera. I have had no opportunity of examining in case of children, but in one hundred autopsies of adult insane persons, the evidence of causation of the mental derangement was in abdominal or pelvic lesion—thirty-seven per cent. in the thorax, the balance in the brain and cord. Much more liable are children to digestive changes of abnormal character; therefore doubtless mental changes are more frequent from such causes than with adults.

From a careful study of the reports of hospitals and asylums for the insane for twenty years, and from what we may gather from our very imperfect census, I am convinced that insanity is making rather rapid increase. In the last report (55th), of the Commissioners of Lunacy in Great Britain, January, 1901, the increase of certified lunatics in the ten years ending December 31st, 1900, was at the rate of 2,115 per year. The statistics of England upon insanity are probably the most reliable in existence, as there all persons of unsound mind, even those kept at home or cared for in private institutions, must be reported. If insanity is increasing among adults, it surely follows that the changing conditions which cause lunacy among parents likewise cause it to increase in the children.

It is only within the past century that mental diseases were regarded as affecting any but adults, Esquirol being the first to give the subject of mental diseases of children much at-

tention, and it is only within the past twenty-five years that the matter has been taken up as a special study. This special study has been induced, first, from the greater interest developed in the pursuit of psychiatry, which must have for its basis the very first dawning of the infant mind, with careful observation and notation until psychical maturity is reached; second, the study of heredity and criminology in all its phases as manifest in children; third, the great increase and the great number of juvenile criminals and the relation of crime to mental defectiveness.

Idiocy, of course, is nearly always congenital, or produced by disease or traumatism before mind manifestations have occurred.

Feeble-mindedness is an arrest of development at various periods from disease or accident. Thus, a child may be healthy and normally developed in mind until three, four, or five years of age, and then from meningeal disease or traumatism have the power for mental development cut off, and no matter how the body may develop in human perfection, the child's mind remains at its place of cutting off. A child mind so arrested at two or three years of age, would at ten years old be regarded as idiotic by the world at large, and one whose mental development stops at ten or twelve years would be called feeble-minded at adult age.

In the month of February, 1902, I saw a family of three congenital idiots of ages ranging from eighteen to twenty-five. There were three other children of the same family said to be perfectly sound in mind, although one of them I know to have occasional attacks of epilepsy. I could not find a trace of hereditary tendency upon either side in the parents; but, be it remembered, there is nothing more uncertain than the vouched-for purity of blood.

Hebephrenic insanity may assume all the forms of mental derangement of the adult and requires no special classification; thus we speak of hebephrenic melancholia, hebephrenic mania, hebephrenic paranoia, etc.

Excluding those mental changes of pathological character which may arise from injury to the brain, or from constitu-

tional disease at any period of infancy, we find that puberty is the time of development of most of the insanities of childhood. It is near this time, from the tenth to the twentieth year, that not only the sexual organs but the brain is undergoing most rapid changes; the arteries become larger in caliber; the whole body, and the brain in particular, becomes larger, broader and deeper; millions of latent cells are ripening; so to speak; great quantities of new blood are demanded. This transition is always manifest in changes in the figure as well as the mind; at its completion the contour and character of the individual is established.

The period of puberty is usually stated by medical writers as being from twelve to twenty years of age, but my own observation, and information collected from reliable persons of either sex who gave me their personal experience, is that in many precocious children the first dawn of puberty is from eight to ten, regardless of sex, and that in cities the period of sexual development commences earlier than in farm and village districts. I have not observed any distinction as to race but social position seems to determine the period of sexual growth. Children of wealthy or indulgent parents who have no occupation except their school exercises, and who have many hours each day for amusing themselves by overheating their imaginations from fairy tales, children's magazines, newspapers, and various "yellow" journals, develop sexual proclivities prematurely as compared with boys and girls who have to help their parents in some systematic manual labor.

The form in which hebephrenia most frequently develops in girls is that of melancholia and is largely due to the exhaustion of the physical and over-stimulation of the mental faculties. As I write this I read from a morning paper of a girl, aged fourteen, who became melancholy a few days ago, and last night committed suicide with carbolic acid. Who knows how long she had nursed a secret of unrequited affection which she had fabricated from an over-stimulated imagination? Last week it was a boy, aged ten, who, in melancholy mood, deserts his school and parents and wanders many miles away to his former childhood home, and finally returns,

having the delusion that he had been kidnaped. Many subjects of hebephreniia, particularly girls, having devoted their youthful minds to much romance, become sullen and irritable from what they believe the "cruelty of parents," and imagine themselves "adopted" by those she calls father and mother, hence many such girls wander from home. I am reminded of two or three such cases that have occurred within a few years; one where a girl, aged twelve, wandered away from home on an unknown road, sleeping for two nights in straw stacks, and when found by farmers she related that, being of doubtful origin, she had in consequence been driven from home by her foster parents, whereas, in truth, she had the most affectionate of parents and an elegant home.

Among boys the rapid and frequently premature advance of puberty plunges them into a life of mental dissipation wherein they become violent of temper, restless of all restraint, boisterous, given to immense exaggerations, and with a decided tendency to seek the company of low and wicked companions. Many children at this period are guilty of theft and of wanton cruelty to animals.

Children who are brought up with over-intellectual and insufficient physical exercise, who live on soft foods, "predigested" cereals, and other foods which are good only for the incomes of newspapers and other advertising mediums, become anemic just at the period of life when they require a good volume of blood of the best quality. I recall that Oliver Wendell Holmes relates where a girl of ten suddenly became an egregrious liar as well as a kleptomaniac, which was cured, not by punishment, but by being taken from the city schools in Boston to an outdoor life on a New Hampshire farm, and given tinct. ferri acet. in ten drop doses every four hours, which treatment restored the child to her former truthful tongue and to a due respect for the rights and property of others.

By hysteria we mean a peculiar increased excitability of the cerebro-spinal and sympathetic system, with decrease of cortical inhibitory power. The cause is largely constitutional,

wherein heredity plays the most important part. Mental strain and the cultivation of the aesthetic and emotional are most directly responsible for the early development of hysteria in American boys and girls. Mental contagion and irritation are rarely observed among children in Europe owing to the widely different relation the child holds to social life, and to the different methods of education. Children who are not physically strong, who have impaired digestion, who do not get sufficient sleep or nourishment, or who have been overworked at school, are generally hysterical, with but little, if any, mental impairment. They are irritable and cannot control their emotions; shed tears in abundance over trivial matters, or laugh inordinately over things that have little fun or humor in them. It is not my intention to treat of this form of hysteria now, but to present the more serious one of mania of hysterical origin or hystero-mania.

CASE I. Boy, inheritance and former conditions unknown; came to America with a widowed mother when six years of age, neither mother or child could speak English, mother sustained herself by sewing, boy put to school at once. Came under my observation three years after (age 9). Upon physical examination I found him rather slender for a boy of that age, with head disproportionately large. He had well developed muscles, however, and, according to his mother was strong enough to punish her with his fists, or with a stick, when he thought her very disobedient. I found the boy could speak English without an accent and could read and write as well as the average boy who had attained the usual grade before entering the high school. He was taking books from the Public Library, reading the daily papers, etc. He acknowledged that for two years he had habits of masturbation. His special form of hysterical mania was that of a paranoiac; his delusion that of grandeur and power, which he tried to impress upon all. Other boys would not play with him because he desired to be "It," and to dictate. Any check to his plans met with direct physical resistance on the one hand, or the most cunningly planned revenge upon the other. He dictated his mother's plan of life, wished her obedient to his will, and when severely punished by the combined force of the priest, neighbors, teachers and friends, was as unconvinced of his supreme power as any martyr who went

to the torture. This boy's hallucinations are not suggested by the ordinary "yellow" literature which leads so many youths to become thieves, detectives, Indian fighters, etc. His great idea is his supremacy as a ruler—a Napoleon in war, a Franklin in philosophy, a Bacon in literature. He scorns work of all kinds; a request to perform ordinary errands for his mother is regarded as an insult to his dignity.

CASE 2.—A girl of twelve, of marked purity of character and personal beauty, who had attended school since she was six years of age, and whose pride had been a record that showed no hour missed in school, no reprimands, no "bad marks" of any kind. When the time for her final examination, after which she would be advanced to the high school, drew near, the strain upon her mental and physical powers was quite apparent: She became anemic, took her meals with her book beside her plate or mentally recited her lessons while eating, then would hurry to school. Her nights were spent in constant reviews of the day's work. At last when the dreaded day was over and she had excelled in her examinations, ever beyond her own great expectations, instead of accepting the congratulations of parents and friends with joy, she walked home alone, and in tears. She tossed about all night, the next morning laughed and cried alternately; the evening of that day she was shouting and screaming, trying to escape. The third day a raving maniac, using language both vulgar and blasphemous, cursing her parents, tearing her gowns, exposing her person, and guilty of the most indecent acts in the presence of others. This continued, with occasional intervals of apparent quietude of short duration until she was nearly fourteen years of age, when menstruation was established and she was restored to health almost as suddenly as she had been attacked by the disease.

CASE 3.—A boy, aged eleven, inherited a highly nervous temperament; a bright boy at school and a great reader of the newspapers. He read in an evening paper the account of a child being bitten by a mad dog, in which was described with great minuteness the symptoms manifested by the child during the convulsions of hydrophobia whch followed. The following day, the boy having recalled the fact that he had once been slightly pinched by a neighbor's little dog, became melancholy, and in a few days commenced barking at times, with occasional convulsions. He would chase the family out of the house by running on his hands and knees after them, growling and snapping at their feet and legs. This continued

for a fortnight, when his physician, discovering that it was hystero-mania from suggestion, ordered treatment of solitude in a dark room with a diet of bread and water, and cold baths in case of convulsions. Suffice it to say the sympathetic hydrophobia was cured in twenty-four hours.

CASE 4.—A very sedate, modest girl, aged fourteen, suddenly disappeared from her home last March. She was regarded as a model of propriety by the neighbors. For several days she was sought for by parents and police; there was much newspaper notoriety given the case. After a week's suspense the parents received a letter stating that she had eloped with and married a Spanish Count, and, to use her own words, "as she wrote she could look out upon the beautiful gardens and fountains that surrounded the ancestral castle of Count Don de Castoro." Now, when the girl was found by the police a few days later and her case examined, it was found that for several weeks she had not been at school, but in disguise had attended a "low down" theatre, and that her letter from the "banks of the Arno" was from a cheap lodging house on the bank of a muddy ditch six squares from her home. I will say that this same girl, by aid of a cunning lawyer, sent an old soldier to the penitentiary because he had asked her to come with his daughter and spend the night when he had no idea she had any home to go to; thus an act of charity it construed by a common jury to be a crime, where the evidence was solely upon the testimony of a pretty lachrymose lunatic, and said evidence suggested by the attorney to keep the girl from being sent to the reform school.

Another case I personally have knowledge of is where a girl aged sixteen, only child of a widower, swore that her father had assaulted her with criminal intent. The father was sent to the penitentiary, the girl was sent to live with friends in a distant State, where under new surroundngs and better diet, she recovered, and acknowledged her error.

The object of this paper is not to present the question in a scientific manner; that cannot be done. This is simply a suggestive subject and I wish data and facts from physicians. My opinion is that the subject of our methods of educating children in relation to this production of neurosis is one of the main questions for investigation. Are we not over-educating and under-training in useful lines? Are we not trying to make each boy and girl feel that an education

is desirable for society and position, or a means to get money without hand work or hard work?

Professor Jordan has said that it is useless to put a five thousand dollar education on a fifty-cent boy, but I think the fifty-cent boy might become a five thousand dollar or a fifty thousand dollar man if he have knowledge instead of education; knowledge of how to work, how to develop the best talent with which Nature has endowed him. Education teaches how to do, knowledge is knowing.

I think the truant officer, who now chases down boys who evade sititng in a dull school room learning a smattering of empty nothings for four or five years, should hunt them up to give them manual training three or four hours a day.

As to books and newspapers for boys and girls, I deem them a leading feature in the production of immorality and insanity among children, and if not well watched the Carnegie Library system will become a curse rather than a blessing. A child's mind is inflamed by bad suggestions, and the average boy reader admires the author of vile romance more than he does the Author of the Ten Commandments.

What treatment would I suggest? Nothing will prevent the disease while it is cultivated as at present under American ideas, but when a child becomes insane it should be at once removed from the parents and family, and be given all the hygienic treatment of good food, good air, abundant exercise combined with play and daily systematic manual labor of a kind that it shows a liking for. Medicine the same as in general practice.

I have collected nearly three hundred cases of hebephrenia, all occurring in and about the city where I live, and would be obliged to any physician who will add to my store.

With this, I thank you for your attention, and would gladly hear the matter discussed.

DISCUSSION.

Dr. Albert E. Sterne, of Indianapolis, Ind.—Mr. President: I deem it a privilege to be called upon to open the discussion on Dr. Fletcher's paper, for I can assure you, gentlemen, there is no one more capable, either through natural

ability or from a broad experience, of discussing this subject than Dr. Fletcher. He is a man who has dealt with this subject for several decades. He has been an extremely careful observer. Those of you who do not know him personally have missed the acquaintance of a man who has made it a point all through life to go to the bottom of things if he could do so. It is an important subject. He has dealt with the psychical condition of the earlier years of our girls and boys, a subject which ought to appeal to the physician, because we are the ones to whom these cases come. We are consulted in these cases. It would consume too much of your time to enter into the major points of the paper, and I shall therefore confine myself to two phases of it.

I have seen a number of cases, and I frequently find that boys and girls who show mental discrepancies in early years, before the age of puberty, are very apt to be subjects of epilepsy of an unrecognized type. They are very apt to present themselves with what we term the epileptic equivalent without convulsions. During this epileptiform psychical stage, without physical manifestations, such little ones are apt to show a marked or total departure from the ordinary habits and modes of living. Such a little patient came under my notice not long ago in the clinic at the college. He was brought by his mother, because she could not do anything with him. He could not study at school; the teacher would not keep him at school. He, at times, was an excellent student, and showed studiousness for a considerable length of time, says for days and weeks, when he would suddenly, without any provocation, revert to the opposite condition; would stand up in school, begin to curse and revile his teacher. He would take a knife and go to his mother and say, "I would like to kill you." He began setting fire to stables and barns. He went to the insurance office and said that his mother was dead, and that he was there for the purpose of collecting her life insurance. Finally, he was brought to me with this history, that several years ago he was struck on the head. At that time I made a diagnosis, after careful consideration of the epileptic condition, and ordered the child sent where I could observe him carefully. He was sent to my sanitarium, and in one of his angry moods he came to me in the same way that he did to his mother, threatening what he would do, whereas formerly he was gentle and loving, and he said I was trying to do the best I could for him. But he took his knife, and approached me in the same manner that his mother had described. Within a short time that boy developed the true

epileptic condition, with convulsions, and all the manifestations that accompany epilepsy. I make it an invariable rule in these cases of girls and boys, who are nervous and irritable, at or near the age of puberty, to advise a complete change, or as near as possible a complete change in their modes of living. If a child is at school and is becoming nervous and irritable, over-studies and is zealous in his work, and is showing the symptoms Dr. Fletcher has mentioned, I advise that that child be taken out of school. Girls nearing the age of menstruation should be particularly cared for, but if they are perfectly healthy otherwise, I do not think it is necessary to take them out of school. If these children are calm, placid, able to take care of themselves, with a considerable degree of equanimity, I do not advise that they be taken out of school. In some cases it is well to send these children into the city if they are country children, and send the city children out into the country. If they are very nervous and irritable, they should be taken out of school, placed under hygienic and proper surroundings, so that a great change in the psychical element may be brought about. Send the city children to the country in the open air, and the country children into the city where the surroundings are different and the food is better than in any circumscribed region in which they may have lived, and I find with very simple measures, attention being paid to the nutrition, etc., that many of these children come out all right, and that the manifestations of a distinctly psychical type disappear.

Dr. Fletcher (closing the discussion).—I agree with Dr. Sterne perfectly in regard to the form of masked epilepsy that is manifest in many children, but not pronounced by a convulsion of any kind except during great mental and psychical excitement.

I remember very distinctly a case reported by Dr. Ray some forty years ago, in the American Journal of Insanity, where a boy, who was unusually quiet and upright in his life, suddenly changed his habits, and although he did not have true epilepsy, he had masked forms of attacks of anger, during which he could scarcely be restrained. These attacks continued until after puberty. When he was eighteen years of age, a surgeon in London made a careful examination of his head, and found a cicatrix, which induced him to trephine and remove a small spicule of partly absorbed bone, represented to be as large as a carpet tack, which was partially driven into a convolution of the brain. I do not remember

the exact location. After the removal of the spicule of bone, the child regained its former tone, and had no more trouble of that kind.

I merely speak of that case for the reason that I imagine there are many other such cases among children. It was observed, by investigating this case thoroughly, that the teacher at school had struck the boy upon the head with a ferrule about three weeks previous to the coming-on of the attacks. The boy was struck on the head for some trivial misdemeanor. It had produced a fracture of the internal table, and the disease continued from the time the child was about ten years of age until he was eighteen. How many children have blows and injuries of the kind, we do not know. Such accidents are particularly of the kind described by Dr. Sterne, wher the condition of furor comes on almost like an epileptic convulsion, but without the manifestation of a convulsion. I can recall two other cases.

I would be thankful to any of the gentlemen, if at some future time they have cases of this kind, they will give me notes of them, for I have been working on this subject for many, many years.

XXXIV.—THE TREATMENT OF EXOPHTHALMIC GOITRE BY ELECTRICITY.

BY H. M. BEAVER, M. D.,

SPRING HILL, KAN.

Definition.—Dunglison defines exophthalmic goitre as an anemic condition of the system, accompanied by protrusion of the eyeballs, palpitation of the heart and arteries, and tumefaction of the thyroid gland.

Graves' disease and Basedow's disease are other names given the condition in honor of Graves, who recognized it as early as 1835, and of Basedow, who reported it later. Exophthalmic goitre is to be considered as a distinct and separate disease from common enlargement of the throat, called bronchocele.

Etiology.—What climate may have to do in causing these goitrous conditions will not be discussed in full here. I believe entirely too much credit is given climate and drinking

snow water from the mountains as a cause. High elevation may be a contributory cause. People crossing the Rocky mountains are sometimes affected with nose bleed, as they call it. Why? Elevations of extreme height have light air. The atmospheric pressure, being less than they have been accustomed to in their valley homes, causes a dilation of the blood vessels of the nose and hemorrhage.

May not a continual residence at a high elevation have a weakending effect upon the circulation, resulting in permanent dilation of the small arteries which supply the thyroid gland with blood?

In studying the pathology of exophthalmic goitre I find that authorities pretty well agree that its exact nature and its cause are rather obscure. The strongest evidence I can find points to a morbid condition of the circulatory system, which is primarily of nervous origin. Cardiac disturbance is the first symptom, followed by enlargement of the thyroid and protrusion of the eyeballs. Other symptoms are anemia, mental depression or exaltation, irritability, amenorrhea, dysmenorrhea, insomnia and nervous phenomena of various kinds. All the above symptoms may be caused by a determination of bood to the brain and spinal cord, and especially so if the medulla oblongata be involved. Morbid appearances after death in and around the cervical sympathetic nerves have been found in some cases, but whether these can be attributed to the diseases *per se* is doubtful, as death in these cases is usually due to some inter-current malady. Therefore we come to the conclusion that very little knowledge can be derived by post-mortem examinations as to the exact seat of the lesion of this disease. Others have thought the lesion located in the cervical portion of the spinal cord, or in the medulla oblongata. Ranney, in his Lectures on Nervous Diseases, says, "The view seems to be gaining ground that we are justified in regarding this form of disease as a result of a disturbed action of the medulla oblongata and possibly some of the higher centers of the brain." The prominence of the eyeballs Ranney attributes to several factors. Among these he mentions an unnatural turgescence of the vessels of the orbit,

an increase of the fatty tissues of the orbit back of the eyeball, and a degeneration, or lack of power, of the ocular muscles, which allow the eyeball to bulge forward. It is interesting to note that among the factors that may cause exophthalmic goitre are to be found undue excitement of the mind and physical or mental over-exertion. These two may be prominently mentioned. Blows upon the head, protracted illness of an especially debilitating nature, nervous depression and hemorrhage have all been known to cause it. Females between 18 and 45 years of age are peculiarly susceptible, owing no doubt to the numerous abnormal functions of menstruation, and nerve-racking periods of pregnancy and confinement.

I will conclude my remarks upon the etiology of this disease by making this assertion: I firmly believe that any disease, or any mental or physical condition which tends toward a determination of blood to the brain and medulla oblongata, may result in an inco-ordination of nerve function, which in time will produce every symptom and condition found in the disease learnedly called exophthalmic goitre.

There is one thing about this name exophthalmic goitre that I like: It is a name that strikes the laity with awe, and prepares them to accept a prolonged treatment.

Exophthalmic Goitre a Neurosis.—Having come to the conclusion that exophthalmic goitre is a functional disease of the nervous system, the nearer we can locate the seat of the lesion causing this nervous disturbance the more intelligently can we treat it. The cerebro-spinal axis of man is a powerful motor force, capable, as a whole, of producing a number of varied and complicated functions, and, as individual parts, special acts.

It would consume too much time to discuss cerebral localization and speciál functions here, but it would be worth your while to review along this line in studying that portion of the brain and spinal cord that regulates the more vital organs of the body, namely, the heart, arteries and lungs.

The function of these organs is directly and seriously impaired in this disease and the effect of this injury reverts

back upon its first cause, and tends still further to complicate the case.

The medulla oblongata and the cervical ganglion of the sympathetic nervous system require special study, for in them you will find the physiological lesions which cause the incoordinate nerve action, the secondary cause of exophthalmic goitre. The restiform body of the medulla, the floor of the fourth ventricle, gives origin to the pneumogastric nerve, the one most affected in this disease.

Dalton, in his human physiology, says, "The general results of experimental operations on the cerebellum show that the surface of this organ is inexcitable by ordinary means, and that its mechanical irritation gives no evidence of sensibility, while in its deeper portions both excitability and sensibility become manifest in proportion as the irritation is applied nearer the medulla oblongata and the inferior peduncles."

The pneumogastric nerve is a mixed nerve, receiving its fibers of sensation at its origin, and its motor fibers from the spinal accessory, the facial, the hypo-glossal and the two upper cervical nerves. The cardiac nerves derived from the cervical portion of the sympathetic regulate the motor power of the heart. This action is modified and held in check by a branch derived from the pneumogastric nerve through the cervical ganglion.

The pneumogastric is therefore the inhibitory nerve of the heart. Stimulation of this nerve slows the heart action, and especially is this modification noticed if the irritant is applied near its origin where it receives its motor filaments from the other cranial nerves. Paralysis of this nerve would cause increased heart action and rapid pulsation in case the lesion causing the paralysis were located near its origin. Its inhibitory power would be destroyed.

Before passing to the medical treatment of the exophthalmic goitre I wish to call your attention to that part of the sympathetic nervous system called the vasomotor nerves. These nerves supply the muscular coat of the arteries with contractile power. The relative number of muscular fibers

compared with the elastic tissue in the arterial wall increases as the size of the arteries diminish, being almost entirely muscular in the smallest branches.

This muscular coat is wrapped around the artery. Any contraction of its fibers would lessen the caliber of the vessel. Stimulation of these vasomotor nerves by the galvanic or faradic current causes contraction of this muscular coat of the arteries, depleting the organs that they supply with blood. On the other hand, if these nerves are paralyzed, or overworked in trying to maintain the natural caliber of the artery. against an increased heart action, the muscles no longer have the power to resist and control this onward flow of blood and as a consequence too much blood is pumped into these weak, dilated vessels by the strong pulsation of the heart.

These muscles may be weakened in time by the continued strong heart action found in this disease. In the most typical case I have had the patient, a gentleman, stated to me that he did not notice any fullness of the thyroid for three years after he first became aware that his heart was not acting as it should.

The Treatment of Exophthalmic Goitre by Medicine.—Medical treatment has not proven satisfactory to me, but I would not entirely ignore the use of drugs. Sedative and tonic remedies, which will allay nervous irritation; remedies that have an astringent effect upon the blood vessels; and hygienic measures may all be tried with benefit. In fact, the whole object of treatment, as summed up by the different authorities, consists in allaying nervous irritability, and restoring tone to the weakened and dilated blood vessels of the thyroid gland and adjacent tissue. The arteries of the brain and medulla oblongata, which are abnormally distended, require active treatment, for as long as this congested condition remains it acts as an irritant to the nerve centers, the effect of which we have already mentioned. To overcome this congested condition is a difficult task; were it not so I should have no occasion to present this paper.

The Treatment of Exophthalmic Goitre by Electricity.—In introducing the electrical treatment of this disease I offer

you as a recapitulation of what I have said, and as a basis for further remarks, the following premises:

First—Predisposition may act as a cause.

Second—The exciting cause may be prior illness, injuries about the head, or over-exertion, physical or mental.

Third—The exciting cause involves a determination of blood to the brain and medulla oblongata.

Fourth—This determination of blood acts as an irritant by pressing upon the nerve centers, causing the inco-ordinate nerve action found in this disease.

Fifth—The symptoms referable to the heart, lungs, stomach, thyroid gland and eyes are nervous phenomena.

Sixth.—The cardinal principle of treatment is to decrease the flow of blood to the head. When this is accomplished all the minor symptoms will subside.

In discussing the treatment of exophthalmic goitre by electricity I shall take it for granted that results are what we want and therefore shall confine what I have to say to the mode of application and the results obtained, using the two prominent cases I have had as object lessons.

It is self-evident that electricity is a powerful motor force, both in mechanics and medicine. We can see its results much better than we can see just in what way these results are obtained.

The first case I shall call your attention to is that of a young married lady, age 26 years. Has had one child, aged 7 years. Has suffered from dysmenorrhea since confinement. Has had all the usual heart symptoms and other nervous phenomena. About four months previous to consulting me she first noticed an enlargement of the throat, with an uneasy feeling in her eyes. When I first examined her the prominence of the eyeballs and enlargement of the thyroid gland was distinctly marked. I decided at once to give her treatment by electricity, but supplemented it with medicine.

She complained of the medicine not agreeing with her, after she had taken it about a month, so I had her discontinue it entirely. Gave her daily treatment with electricity for one month, continuing it every alternate day for another month. At the end of the second month she had made such a decided improvement in every way that I decided to give her an inter-

val of rest for one week, then report. During this week of rest she lost none of the benefits of former treatment. I then continued the treatment every other day for another month. At the end of this time I dismissed her and told her to report if she noticed any of her former symptoms returning. Two months have elapsed without hearing from her. I shall still hold this case under investigation for future reference.

Mode of Application.—The mode of application was as follows: Battery used, McIntosh's twelve cell galvanic and faradic combined. First applied the faradic current from hand to hand for general stimulation. Time of application of this current, five minutes. Followed the faradic current with the galvanic current, with the positive pole to the back of the neck and the negative pole to the thyroid gland, finishing the treatment by moving the negative electrode up and down the side of the neck to stimulate the cervical sympathetic nerves. I continue the galvanic current from ten to fifteen minutes, giving them all they can stand with comfort. Usually eight or ten cells will be required. The amount of electricity used will be two volts for each cell connected in the circuit.

This case ran a more rapid course than these cases usually do, and was also more amenable to treatment. I would call this an acute case to distinguish it from my second one, which I now report as a chronic case. In these two cases you will find the two extremes.

CASE II.—A gentleman aged thirty years, single, hard-working and industrious. About eleven years ago he became over-heated, and suffered more or less from a flow of blood to the head during active exercise for some time, when he became aware of heart symptoms. This strong, rapid and irregular pulsation of the heart was worse following active labor.

This condition continued about three years before he noticed any enlargement of the thyroid gland or protrusion of the eyeballs. During this time he contracted the bicycle mania, and in spite of his condition became a noted speeder. He soon found that he could not stand bicycling, and gave up his fast riding. He says it made him extremely nervous to ride his wheel; that he would never have had goitre had it not been for the continual strain upon his muscles and nerves that he experienced while riding his wheel. His case had remained stationary for five years prior to his taking electrical treatment. Up to four months ago he had taken medicine regularly for a number of years, from a number of phy-

sicians, myself included. I had prescribed medicine for him during the last two years, with only temporary benefit.

I have had him on electricity four months, giving him daily applications of galvanic and faradic currents as explained in first reported case. He has made decided improvement in every way. His case will require continued treatment, as the thyroid gland has assumed a hardened condition analogous to fibroid growths. However, I hope to establish a permanent cure.

In conclusion, I wish to state that after much study I have come to the conclusion that exophthalmic goitre is a vaso-motor paralysis involving the thyroid arteries and the arteries of the orbit, as outward manifestations of the intra-cranial pressure upon the nerve centers. Electricity is indicated in this condition of vaso-motor paralysis, as it is in other forms of paralysis.

DISCUSSION.

DR. FRANK P. NORBURY, of Jacksonville, Ill.—Mr. President: I do not think that exophthalmic goitre is fully a functional disease, nor wholly a disease of the vaso-motor system. On the contrary, my experience has been that we have more or less evidence of a toxic origin of the disease, especially if we follow the cases through to their termination. It has been my fortune to see four cases, the cause of death being exophthalmic goitre, two of which came to autopsy. The two cases which I saw at autopsy showed evidences of a more profound disturbance than simply a vaso-motor condition. There were some alterations or structural changes in the medulla in one case. In another case there was some disturbance indicative of structural change in the heart. I saw three of the cases from the beginning to their termination, and the conditions which led to the fatal termination followed closely those cases which we see that are essentially toxic in their nature or due to irritation of the vaso-dilator nerves in the medulla, namely, disturbance of temperature; a continued high temperature. which continues after death just as we find in cases of sunstroke, which we are taught to believe may be toxic in character, and also show vaso-dilator paralysis due to organic interference with the inhibitory centers. In two cases the temperature was as high as 107 2-5 degrees, and continued along to about 106 degrees one hour after death and 101 4-5 degrees two hours after death. In other cases which I have seen there was apparent or probable recovery, and although

the exophthalmus exists still in one case, the goitre and heart symptoms have entirely subsided. In another case the exophthalmus has disappeared, also the goitre, but a continued rapid pulse is noticed. One of these cases was treated for tuberculosis, the patient being sent to Colorado, and the case recognized there as one of exophthalmic goitre. She returned home because of the high altitude affecting the heart's action. This young lady was a singer; she had a sweet voice which was changed very considerably by the development of the exophthalmic goitre, but with an improvement in her condition, which is going on, she has now considerable use of her voice again, which is returning with some power, although it breaks when under continued use, on account of the nervous disturbance present. Tremor is still a feature in this case.

I am inclined to believe that exophthalmic goitre is a condition the true pathology of which has not yet been entirely made out. It can be both toxic and functional, and is probably organic. Many of the cases are undoubtedly organic in origin—organic disease of the cervical sympathetic. In one case, the one that recovered, with the continued exophthalmus, resulted from a fright. The young lady, in company with her escort, was held up by a footpad, and within twenty-four hours thereafter there were nervous manifestations, with resulting exophthalmic goitre. She developed also a condition of edema, somewhat resembling myxedema, with the involvement of the entire glandular system, and edema of the abdomen and extremities. Interesting heart symptoms were noted in this case. This patient improved materially on the use of thyroidin.

Dr. Everett J. Brown, of Decatur, Ill.—I have had some experience with this disease, and while it is considered an affection peculiar to women, I have seen three cases of it in men. One man has aparently recovered, except the exophthalmos. He was under treatment for six or eight years, but nothing seemed to help him. Finally, he stopped taking medicine, and got much better. He was given so much iodides and other drugs as to cause harm; but he is now free from his tachycardia and goitre. I have had one case materially improved by the use of thyroid extract. But most cases are made worse by the thyroid extract. In this disease there exists a hyperthyroidism characterized by diarrhea, profuse perspiration, the thyroid extract always increasing these symptoms. In such cases if we give the thyroid extract we make them worse, but, as I have previously said, one patient seemed to be made better by the use of the thyroid extract.

I recall the case of a physician who has practically recovered, although he still has exophthalmos. I recall one case of a woman who had a constant pulse of 130 for two years. The thyroid gland was enlarged on one side, with double exophthalmos. She was rapidly cured after changing her occupation, which was that of a cashier.

I believe in the toxemic theory of this disease. Fright may produce such a toxemia. This woman above mentioned is married; has had two children, and is perfectly well except for the existence of a slight exophthalmus.

DR. CHARLES B. BROWN, of Sycamore, Ill.—I have had three cases of exophthalmic goitre within the last two or three years. One of them was a traveling man, one the wife of a farmer, and the other a young lady of wealth, who, of course, had no occupation, proving that occupation or environment has very little to do with the development of this disease.

Treatment by the thyroid extract in the case of the traveling man had exactly the effect referred to by Dr. Brown, namely, it made him worse. He had no prominence of the eyes; he had all the other symptoms of impairment of the digestive apparatus, tachycardia, etc., for years. His pulse ranged anywhere from 100 to 140. He had to abandon traveling on the road. Treatment consisted in the long-continued use of strophanthus and strychnia, but whether they did him any good or not, I do not know. However, he recovered, either with the treatment, or in spite of it. The exophthalmos was not troublesome. While he has recovered from all the other symptoms, he still has a large cystic goitre, showing a complex condition, and not merely a functional disorder. Strophanthus, strychnia, with rest, did him more good than anything else. The other two patients died.

DR. ALBERT E. STERNE, of Indianapolis, Ind.—I cannot let this subject go by without saying a few words in reference to it. I have seen a great many cases of exophthalmic goitre —I won't try to say how many, for I do not remember. It seems to me, if anything can be an entity, it is a case of exophthalmic goitre or ordinary Basedow's or Graves' disease. We must divide cases of this kind into the clinical and those from a therapeutic standpoint. Some cases of the disease recover under one kind of treatment, and some get well under a totally different method of treatment. I should say, if there is any one thing upon which all of them do well, it is absolute rest in bed for a long period of time. Some patients, as Dr. Brown has remarked, react excellently well to cardiac seda-

tives or stimulants, whichever you wish to call them, like strophanthus, digitalis, strychnia. Others do remarkably well under small doses of the thyroid extract. We must begin with very small doses, and work up to larger ones to suit the individual case. If I use the extract at all, I begin with half a grain, and if there is any disturbance, I increase the dose until I give them five grains, three times a day. That seems paradoxical. But we must remember one thing in connection with this disease, namely, that we are dealing with hyperthyroidism, probably. We do not know positively whether the thyroid is a secretory or excretory organ. We know positively that it is absolutely essential to the human economy. If we removed the entire thyroid gland, the patient would die from what is called cachexia strumipriva. If we leave a portion of the thyroid of a patient, and feed him properly upon very mild doses of the thyroid extract, he will live. Whether the thyroid secretes something that is essential to the nervous system, or whether it counteracts that which is deleterious to the nervous system, it is difficult to say, and nobody has yet found out.

I cannot agree with the essayist that it is a condition which is mainly congestive. I believe that was the term he used; and if so, I disagree with him entirely. It is a noticeable fact that patients who suffer from congestive conditions of the brain do not suffer from exophthalmic goitre. Patients who are plethoric do not suffer from exophthalmic goitre, as a rule.

As to the use of electricity, I must confess that I have seen little good from it, and considering all the cases together that have come under my observation, I cannot say that the use of either the galvanic or faradic current has been of much benefit. I have treated eight or nine cases of exophthalmic goitre by operation, removing the thyroid gland. Dr. Bayard Holmes, of Chicago, reports about a dozen cases, with very excellent results from operation upon the thyroid gland, and these cases have almost uniformly done well.

A point to remember is this, that simple thyroidism can pass into exophthalmic goitre. Girls, especially, who at the menstrual period show enlargement of the thyroid gland may develop the disease. Furthermore, each sucessive pregnancy in women who are already afflicted with this trouble seems to make matters worse. Dr. Brown reports a case of a woman who bore a child after exophthalmic goitre manifested itself, but she recovered. But that is not the rule.

Of all medication and electrical treatment, rest, heart stimulants, etc., I have used, I think the best results are obtained from prolonged rest and quiet.

DR. H. J. STEWART, of Chicago.—I recall a patient who had exophthalmic goitre to such an extent that she was unable to stand or walk on account of tachycardia. The only thing that gave relief was absolute rest in bed. About the time she had her most serious attack and was put to bed, she became pregnant. She was given some ergot and belladonna, other drugs being discontinued, went on and gave birth to a fine child, and from that time she has never had any symptoms of the disease, only there is some protrusion of the eyeballs. The tachycardia, however, has been entirely relieved. It is now three years since she was confined. She absolutely took no medicine at all since the time she became pregnant.

DR. BEAVER (closing the discussion).—It affords me a great deal of pleasure to have heard the discussion following my paper, because that was the main object in writing it. I have been dissatisfied, more or less, with the treatment of exophthalmic goitre, and my principal object in attending this meeting was to see if I could learn anything more in regard to it.

XXXV.—DIAGNOSIS AND TREATMENT OF CROUPOUS PNEUMONIA.

BY W. T. ENGLISH, A. M., M. D.,

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Each of the ever-multiplying avenues of light which illumes the pathway of the twentieth century student of chest diseases is a reflection from the central luminary, Laennec, who, in his Treatise on Diseases of the Chest, nearly a century ago, declared "Peripneumony, or Pneumonia, is inflammation of the substance of the lungs." The terms inflammation of the lungs, and lung fever, are regarded to-day as incomplete, because the pathology of pneumonia receives a different interpretation, as its ocurrence does not coincide with the more common characteristics of the inflammatory process. Moreover, there are charges of waywardness as to the demeanor of up-to-date pneumonia which involve it in epidemic or diffuse outbreak at one time, an endemic or local

exploitation at another, and anon a sporadic or monogamous alliance with individual lungs, in which it elaborates a network of dissolution with insidious celerity. Furthermore, pneumonia has been regarded as the illegitimate offspring of an essential fever, an associate of the unsightly erysipelas, and the boon companion of vulgar parasites. The latest announcement from the bacteriologic laboratory that pneumonia is the offspring of plurality of sire has brought confusion to the faces of the medical noblemen who constitute the vanguard of the profession and have constant and intimate acquaintance with the malady. Because of the laxness of its behavior pneumonia has been awarded some uneasy names and a very elastic freedom has been given its etymologic terminology.

Keeping pace with the amplifying nomenclature and the generosity of classification may be regarded a feat of mental, moral and physical industry on the part of the scion of medical venture, yet he is capable of discriminating and diagnosing pneumonia with a certitude never before attained in the history of the disease. This increasing capacity for identifying cases, which have hitherto been placed in other categories, should be accounted as meritorious. Unfortunately, however, this exactness in diagnosis extends the apparent numerical frequency of pneumonia. Again, it should be remembered that cases hitherto failing to receive recognition have been those with imperfect announcement, almost destitute of symptomology, and fraught with awful danger, occurring in the extremes of age. These not only augment the figures, but add to the mortality of pneumonia as estimated to-day. Because of these estimates, gratulatory recognition has not only been withheld, but the management and therapeutics have been adjudged unworthy. Criticism of this nature is the outcome of regrettable thoughtlessness, whether emanating from the rank or the file, and is due to failure upon the part of the self-appointed judiciary to separate the apparent from the real.

On the other hand, it is fair to proclaim that the perfectionment of pneumonic diagnosis is followed by an almost universal employment of the most rational treatment ever

known. Medical men, who are in immediate touch with clinical facts, are attesting to the efficiency of the generally accepted lines of treatment. These reports include recoveries under most unpromising circumstances, and are possessed of equable elements of truth and force, whether proceeding from the unstable climates of the North, the sultry and humid South, the tame and metallurgic East, or the wild and woolly West. Statistics are entitled to as much consideration when gleaned from the outposts as when received direct from headquarters. Mental vagueness as to the empiric evidence of pneumonic communicability has disappeared from the mind of the medical vanguard, but he naturally looks with impatient hopefulness to the bacteriologist to aid in demonstrating its source. While the advanced physician admits the evidence of Friedlander's pneumococcus and its ally, streptococcus, he insistently maintains an association between the temperature curve and that of pneumonia.

In approaching a case of croupous pneumonia intended for the exercise of his diagnostic proficiency, the wary physician of to-day will keep in mind the habits of the mighty age in which his lot is cast. Its inconsiderate demand upon physical and mental powers he estimates. The stress and strain of *psyche* and *soma* beginning in the earliest training, reaches a tidemark in the institutions of learning which hurry out their patchworks of mental and physical education as nearly equal to the laws of demand and supply as possible. The strenuous life, which is immediately thrust upon the individual after academic preparation, alike exacting in social or business pursuits, together with the natural concomitant struggle and competition for place and power, tend to the production of irritable hearts and nerves, these prompting in turn to a more universal employment of alcholics by both sexes than at any time in the past. This habit begins with many persons within the pale and under the sanction of educational institutions. Pneumonia is made doubly fatal by reason of weakness of nerves and the heart, to which alcholics, constantly or excessively used, render the subjects extremely liable. Rheumatism is also an ally of

pneumonia through increasing frequency and its ravages upon the heart and brain tissues. It is shown that the death rate has increased in large cities from pneumonia, and the causes are assumed to be inclusive of the growth of mental worry, physical excesses, fatigue, dissipation and squalor. To these possibilities men are oftener exposed than women, and therefore, furnish over twice as many subjects. Croupous pneumonia, acute pneumonia, idiopathic pleuro pneumonia of the adult, lobar pneumonia, all synonymous terms implying involvement of large areas, is most common in the active period of young and middle life, and gives a large mortality. Osler claims the death rate to be 36 per cent. of all the cases. Other estimates reduce the fatalities to 20 or 23 per cent. In reviewing statistics it is well to note that those maladies with which pneumonia is associated, as a complication, lose their identity, and typhoid pneumonia is recorded among the pneumonias. Those epidemics of influenzas which show complications of pneumonia add to the death rate by a similar classification. Furthermore, many fatalities occurring under conditions of senility, which should be attributed to vital exhaustion by reason of fullness of years, are grouped to the discredit of pneumonia. Thus the frequency and virulence have the elements of apparent force and may be improved only by better classification and clearer discrimination.

Fully conversant with these facts, the physician approaches pneumonia well equipped with all the needful auxiliaries to diagnosis, which are supplied through invention, and which constitute our most recent armamentarium. The stethoscopes with flexible tubes enable him to explore all regions of the chest with the minimum amount of discomfort to the patient and the maximum certainty to himself. By careful inclusion and exclusion of signs and symptoms, the onset may be determined as to the exact day and hour, and each succeeding step in consequence more surely anticipated. The typical case of pneumonia presents a familiar picture.

The initiatory chill or rigor, lasting from twenty minutes to an hour, substituted by shivering fits or convulsions

in childhood, will be characteristic in 50 per cent. of the cases, and this will be succeeded within twelve hours, perhaps only three or four, by a temperature reaching 104 or 105 degrees. A sharp pain in the side prevents easy motion, cephalalgia places a band across the brows, nausea and general enteric disturbances add to the discomfort, while the general expression of countenance and demeanor forcefully indicate severe illness. The cheeks are red, the face flushed, the tongue and lips dry, and there is complaint of great thirst. The pulse is accelerated to 120 per minute and the respiration to 40 or 50. All these symptoms appear during 36 hours following the chill. One feature usually prominent is the peculiar departure from the pulse respiration rhythm, which normally is 4.5 to 1, but in pneumonia this may be altered to 3 to 1, or 2 to 1. If the urine be examined the gravity will be 1025 to 1030, urates plentiful, but no albumen. Rusty sputum appears with cough in about 48 hours or later, and will be scanty, viscid, sticky and full of air bubbles, numerous micro-organisms will be observed beneath the microscope; but the one most constant in the sputum of croupous or lobar pneumonia is the pneumococcus. The sputum is swallowed by children, and some adults, and may not appear throughout in cases with little or no cough.

The symptomotology as rehearsed continues with some variation peculiar to the individual, until seven to ten days have lapsed, when the temperature falls rapidly, and other symptoms show a tendency to abatement. This fall is accomplished in 16 to 36 hours, and is denominated the crisis. When the temperature is more deliberate in its leave-taking, the act is regarded as the lysis. Of the cases recovering, three out of five end by crisis, and one out of three by lysis.

Temperature may be subnormal for some days, and these periods are full of depression. The seventh day is the one most common for crisis. The fifth and sixth days, together with the seventh, witness the end by crisis of 56 per cent. of all the cases. Trousseau's statement that the critical days are the odd days is often realized.

The physical signs I shall not take time to rehearse.

Their importance is fully appreciated by every diagnostician, and should be carefully explored at each visit, that he may keep informed as to the stage of the malady and condition of his patient. Moreover, by the physical signs we separate the three stages of engorgement, red hepitization and gray hepitization. It will be remembered that the physical signs continue some days after the general symptoms have disappeared One observation which has impressed the writer regarding the physical signs is the utter uselessness of attempting a physical investigation upon the anterior portion of the chest of patients who choose the dorsal decubitus. Inspection, palpation, percussion and auscultation, no matter how perfectly performed, may be divested almost completely of their usefulness when attempted upon the portion of the chest kept uppermost. On the other hand, the physical examination of the most dependent portion will lead to right conclusions. Frequent observations of the pulse will aid in diagnosis and also keep the circulatory behavior well in mind. The elements of character, frequency and regularity, each possess a special significance. The pulmonary circulation should be accorded a vigilant watchfulness by frequnt auscultation over the pulmonary point of intensity. The adult pulse persistently remaining at 120 during three days is in itself ominous of evil. If this condition obtains and steady loss of force is succeeded by irregularity, it is the announcement of approaching dissolution. If the pulse and respiration persist during 48 hours in the ratio of 2 to 1, it is a fatal omen. Relentless temperature, continuing from 104 upwards, without diurnal exacerbations, coexisting with the usual pulse and respiration rhythm of pneumonia, leads to speedy heart exhaustion from thermic or toxic causes. The importance of the symptom of distended right ventricle is overestimated in many cases. If the temperature, respiration and pulse ascend together, or persist without special circulatory demonstrations of weakness, during a period of 24 hours, a sudden yielding up of life may be anticipated, and is more than likely the sequence to toxic influences acting upon the cardiac fibres, and should not be chargeable to hydraulic pressure upon the right heart.

The protoplasm of the heart may undergo morbid changes through persistently high fever, and the nerve centers in like manner may be overwhelmed.

In every phase and stage of pneumonia the advantage of grouping the signs and symptoms, as expressed by temperature, pulse and respiration, becomes apparent. The diagnosis made, and patient placed under hygienic conditions, with a surrounding temperature of 60 degrees, a constant oversight of a capable nurse, and visited every few hours by a physician, or more constantly under medical supervision, with the employment of the accepted treatment as given today, the chances for recovery are 80 to 90 per cent. in his favor. Some cases with good constitutional habits will need little else but quietude, hygienic surroundings, careful diet and oversight. The individual factors in each case appeal to the physician, and in a few cases his duties are simply to avoid being over-officious, and permit his patient to get well.

Treatment of a germ disease, communicable through organisms, might suggest the possibility of prevention. Direct infection, however, awaits more positive proof, and the disease being ordinarily not transmitted from sick to healthy, and the almost universal presence of the pneumococcus in saliva of healthy persons, are matters somewhat confusing and contradictory. Furthermore, the period of incubation of pneumococci will not substantiate the infection theory. Moreover, a previous attack does not guarantee immunity, but increases susceptibility, so that about one-third of the cases recovering have two or more subsequent attacks.

The antitoxic serum treatment theoretically promises more than its employment awards. So far it is not proven that pneumonia can be aborted, although by bad treatment it may be prolonged. One of the earliest elements of treatment is the selection of proper diet. That the ingesta should be liquid is the popular idea. The use of milk and eggs must be regarded as often contraindicated because of fermentative conditions of the prima via. Milk will not digest readily under such circumstances, and eggs will become speedily rancid. Each may occasion gaseous accumulations which by their ir-

Schmiedeberg's digitalin was not a pure product and succeeded in isolating what he believed to be the true digitalin, and named it "Digitalinum Verum." Another product, very nearly the same as the two just mentioned, obtained from the seed, and known as Digitalin Germanic, is the one generally employed for hypodermic injection. All three of these digitalins are amorphous yellowish powders, soluble in water, the degree of solubility seeming to depend upon the amount of digitonin and other similar bodies present, since it is doubtful if any are pure principles, the digitonin, etc., rendering them more soluble.

The French digitalins (Homolles' and Nataville's), differ very materially from the other digitalins, and are probably impure digitoxins.

Fig. 1.—Instruments used in tracings.

The second glucoside isolated by Schmiedberg, digitalein, is probably a mixture of digitalin and inert substances, and need not be further considered.

The third glucoside, digitoxin, has been isolated by several observers, and is a white crystalline powder, insoluble in water, but soluble in alcohol, etc., and is much more toxic than the digitalins.

A number of other bodies have been isolated, as digitin, etc.,

but for practical purposes we can divide those employed in therapeutics into two classes, viz., those soluble in water, as Schmiedeberg's digitalin, Kiliani's digitalinum verum and Germanic digitalin, and those not soluble in water, as digitoxin and Homolles' and Nataville's digitalins. The members of each class differ in degree of purity as they appear on the market.

Determinations of the pharmacologic activity of the products on the market by the method of assay devised by the writer some years ago shows that the products which appear under the same name and put out by the same firm differ considerably in strength, while products bearing the same name, but put out by different manufacturers, vary greatly in

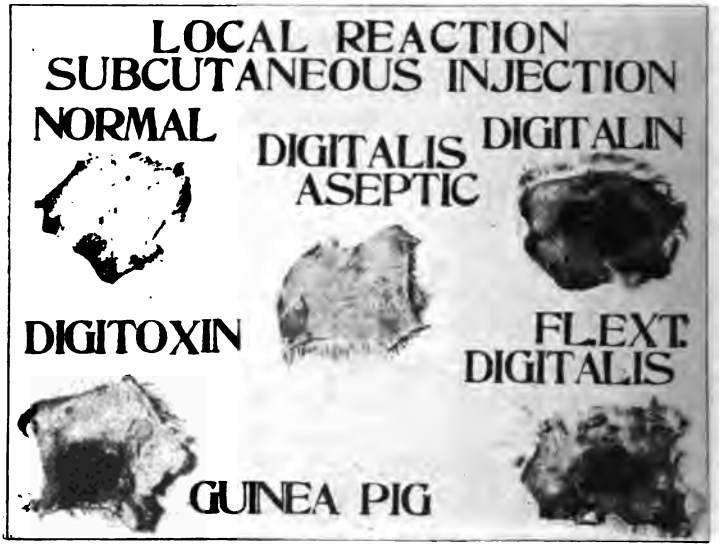

Fig. 2.

strength, sometimes one product being several times as strong as another. Likewise, physicians have observed the same fact in clinical practice, and in some cases have failed to get any action. The reason for this variation in results seems to depend upon the impossibility of determining by chemical means the identity and the amount of any given active constituent present. Clinicians have often reported that digitalin produces much pain and irritation at the point of injection, like-

wise experiments upon animals with different samples of digitalin produce the same result. Reference to the photograph of pieces of skin shows the effect upon guinea pigs, the darkened portion indicating the amount of inflammation produced.

Owing to the great insolubility and irritating properties of digitoxin, it has generally proven undesirable for hypodermic injection, and it is quite impossible to inject the ordinary

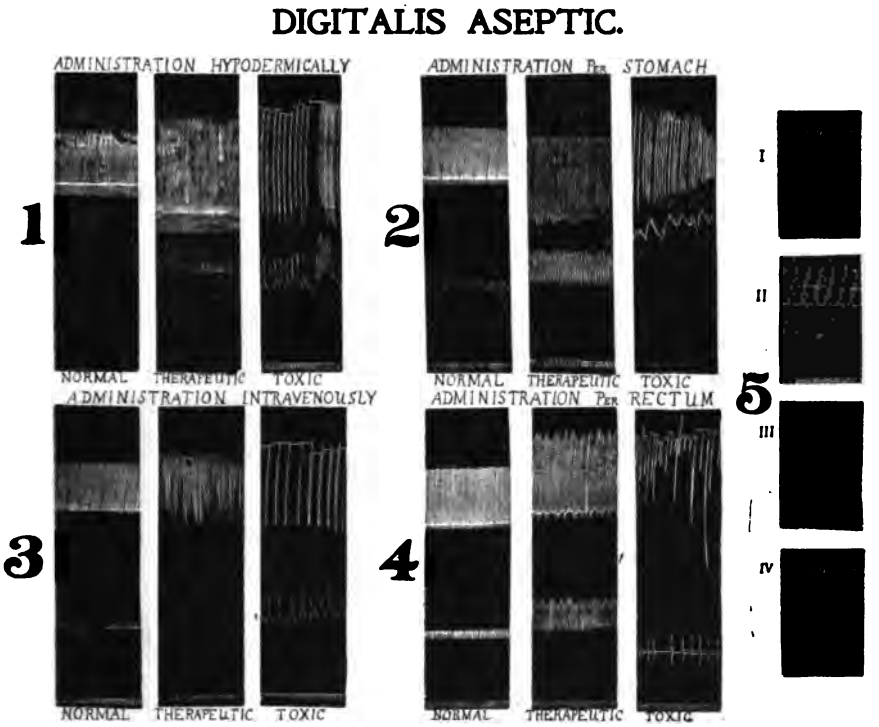

Fig. 3.

galenical preparations of digitalis, as the fluid extract, etc., on account of the large amount of inert and irritating substances present.

A consideration of the above facts suggested the need of a preparation of digitalis for subcutaneous injection of uniform activity, sterile and non-irritating, prepared directly from the crude drug, which would contain the smallest possible amount of inert and irritating constituents and the largest possible amount of the active non-irritating constituents having an in-

fluence upon the circulatory system. Acordingly, a large number of different menstra were employed for percolating digitalis leaves, the activity and irritating properties of each product being determined by experiments upon dogs and other animals by injecting small portions of the products subcutaneously and chloroforming and skinning the animals to determine the amount of irritation at the point of injection. Blood pressure tracings were made from the carotid artery of

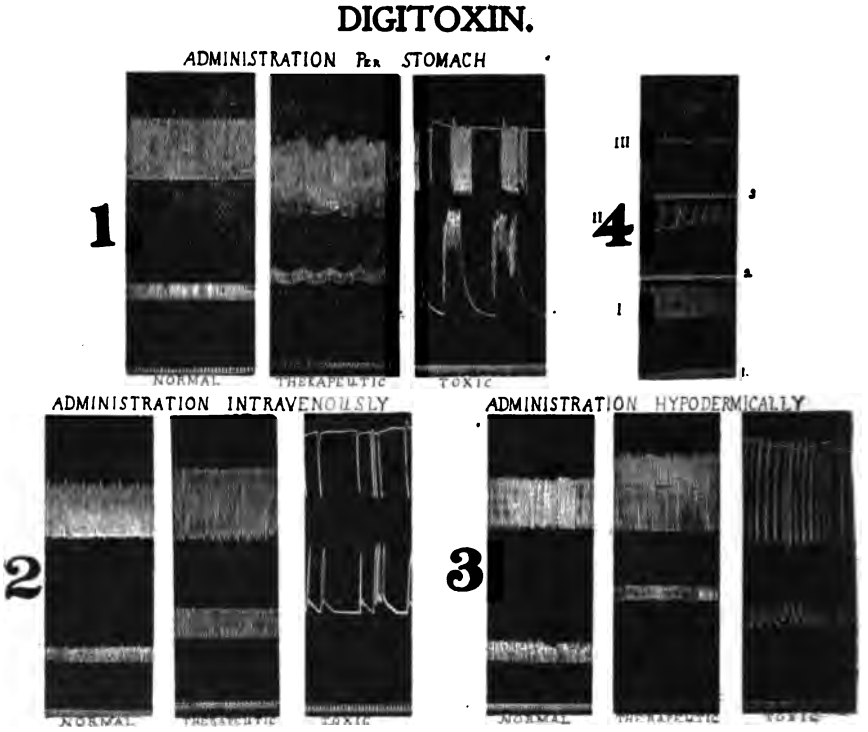

Fig. 4.

dogs and the effects upon the laid-bare frog's heart were observed. Finally, a non-alcoholic fluid preparation of digitalis combined with chloretone containing only a small amount of inert substances was obtained, which seems to be entirely suited for the purposes intended.

Properties.—As already stated the preparation does not contain alcohol, the active constituents of the drug being held in solution by the presence of small quantities of saponin-like

bodies which are normally present in the drug. The fluid is light brown in color, and has been adjusted to the strength of a ten per cent. tincture by determining the minimum lethel dose per gram body weight for frogs of the same species and weight when kept under uniform conditions, comparing the results with those obtained from the injection of known quantities of a standard preparation of digitalis under the same conditions (the method of assay described by the writer in

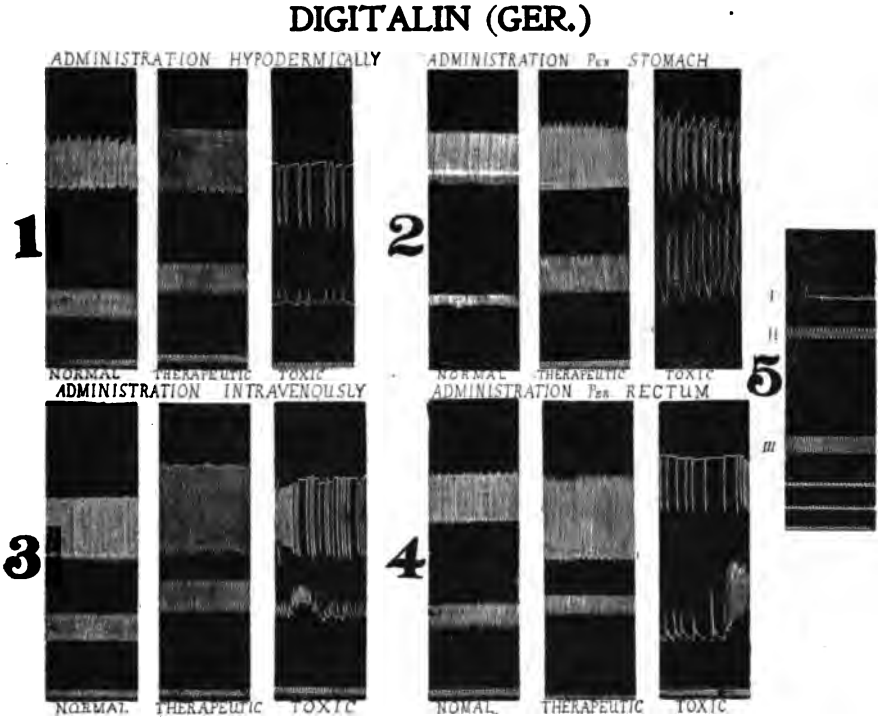

Fig. 5.

a paper read before the American Medical Association). The preparation can be readily diluted with water if desired. Repeated tests were made from time to time by inoculating various kinds of culture media to see whether the antiseptic action of the chlorotone added was sufficient to keep the product sterile. In all cases the planted culture media remained without growth, whether kept at the room temperature or placed in an incubator under the best condition for growth to take place.

Subcutaneous injections were made into a large number of animals to determine whether the product produced irritation at the point of injection. In nearly every case the tissues were found entirely normal in appearance, while in other cases, where other preparations of digitalis were injected, there was much redness and other evidence of irritation. (See cut 1 of pieces of skin from guinea pigs.) A number of clinicians were given samples of the preparation for experimental pur-

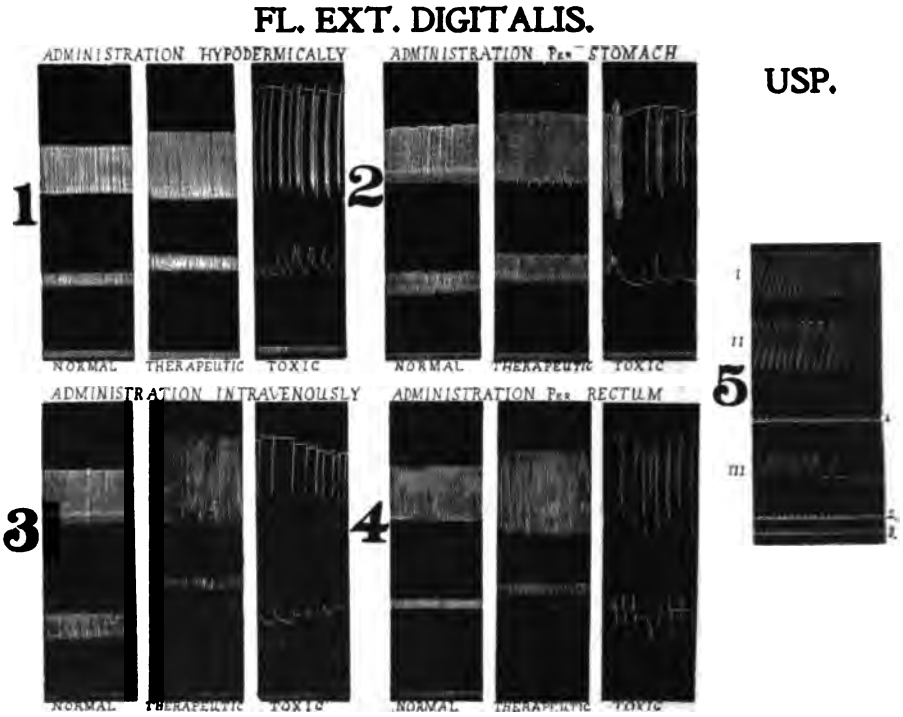

Fig. 6.

poses and in no case was there reported pain and irritation at the point of injection, which may be partially due to the local anesthetic properties of chloretone. Satisfactory results were also obtained from oral administration.

In order to see whether the preparation produces the desired digitalis action or not, myocardiograph and blood pressure tracings were made from dogs anesthetized with chloretone, the drug being administered intravenously, subcutan-

eously, per os and per rectum, the results being compared with those obtained by the administration of fl. ext. digitalis, digitalin and digitoxin under similar conditions. Cuts No. 2, 3, 4 and 5 show results obtained in individual cases. The tables following give summaries of the results obtained upon several dogs. A comparison of the results given in these tables shows very conclusively that the preparation produces an entirely typical digitalis action in the several ways administered. Since the results obtained at the bedside and in the laboratory agree so completely, it may be stated that this preparation of digitalis which I have concluded to call "Digitalis Aseptic," can be used for either subcutaneous or oral administration, the proper dosage being 5 to 15 m. subcutaneously and 10 to 30 internally.

In conclusion the following advantages may be claimed for this preparation of digitalis: It is of uniform strength. It does not produce pain or irritation at the point of injection. It is readily absorbed and produces typical digitalis action when given intravenously, hypodermically, internally or per rectum. It is aseptic and remains aseptic if the container is kept stoppered. It is convenient and ready for immediate use without dilution, either internally or hypodermically.

EXPLANATION OF TRACINGS.

The upper tracings are taken directly from the ventricle of the heart by means of a myocardiograph (see cut).

The down stroke of the tracing is made by the systolic movement of the heart, and the upstroke by the diastolic movement.

Immediately below are the blood pressure tracings taken directly from the carotid artery.

At the bottom are the line records in seconds.

The tracings are to be read from left to right.

DIGITOXIN.

Experiment 1. February 20, 1902. Dog. Weight, 12 Kg. Administered per stomach.

	Time of Tracing.	Time of Administr'n.	Dose.	Rate in 20 Sec.	Ht. of Press. in Mms. Hg.	Amplitude of contrac-t'n in Cms.
Normal stage... ...	9:45 A. M.			24	45	34
Therapeutic stage..	12:05	9:55 A. M.	0.008	22	50	45
Toxic stage.....	3:00 P. M.	1:15	0.03	15	60	40

Experiment 2. February 21, 1902. Dog. Weight, 14 Kg. Intravenously.

Normal stage.....	1:30 P. M.			34	31	30
Therapeutic stage..	1:55	1:40 P. M.	0.003	18	47	40
Toxic stage.....	3:30 P. M.	3:00 P. M.	0.01	4	70	30

Experiment 3. February 24, 1902. Dog. Weight, 12 Kg. Hypodermically.

Normal stage.....	9:10 A. M.			31	30	28
Therapeutic stage..	10:50 A. M.	9:15 A. M.	0.005	24	60	42
Toxic stage.....	1:15 P. M.	11:30	0.02	15	52	58

Experiment 4. February 25, 1902. 0.1 Sol. in 50% Alcohol. Frog.

Normal I.....	2:00 P. M.			13
II.....	2:35	2:10 P. M.	3 drops	4
III.....	3:20	2:50	2 drops	2

Systolic standstill, 3:30.

SUMMARY OF INFLUENCE ON HEART AND CIRCULATION.

	Systole	Increase in Diastole	Amplitude	Press.	Slowing	Rapid. of Reaction	Dias. Standstill.
1. Oral.....	18	-7	11	5	2	2 hr. 15 m.	3:20 P. M.
2. Intravenous...		10	10	16	16	15 m.	3:40 "
3. Hypodermic...		14	14	30	7	1 hr. 35 m.	1:25 "

FLUID EXTRACT OF DIGITALIS (U. S. P.)

Experiment 1. February 1, 1902. Dog. Weight, 12 Kg. Hypodermic administration.

	Time of Tracing.	Time of Administr'n.	Dose.	Rate in 20 Sec.	Ht. of Press. in Mms. Hg.	Amplitude of contrac-t'n in Cms.
Normal stage.....	10:00 A. M.			25	43	27
Therapeutic stage..	11:45	10:15 A. M.	0.8 CC.	21	55	39
Toxic stage.....	4:00 P. M.	2:35 P. M.	4 "	9	50	

Experiment 2. February 3, 1902. Dog. Weight, 13 Kg. Administration per stomach.

Normal stage.....	9:00			21	42	31
Therapeutic stage..	12:30	9:30 A. M.	1 CC.	14	50	41
Toxic stage.....	5:15	2:45 P. M.	10 "	4	42	

Experiment 3. February 4, 1902. Dog. Weight, 11 Kg. Administration intravenously.

Normal stage.....	2:00 P. M.			21	42	30
Therapeutic stage..	2:25	2:15 P. M.	0.03 CC.	17	66	47
Toxic stage.....	3:45	3:30	1	4	60	

Experiment 4. February 5, 1902. Dog. Weight, 12 Kg. Administration per rectum.

Normal stage..	9:00 A. M.			23	51	31
Therapeutic stage..	12:30	9:30 A. M.	2 CC.	18	62	47
Toxic stage.....	4:30	2:00 P. M.	12 "	5	47	

Experiment 5. February 4, 1902. Frog. Direct application to apex of exposed heart. Lever moves up in Diastole. 1:10 dilution in water.

Normal I.....	9:10 A. M.			12
II.....	10:00	9:30 A. M.	3 drops.	7
III.....	11:00	10:25 A. M.	5 drops.	5

Systolic standstill at 11:15 A. M.

SUMMARY OF INFLUENCE ON HEART AND CIRCULATION.

	Systole	Increase in Diastole	Amplitude	Press.	Slowing	Rapid. of Reaction	Dias. Standstill.
1. Hypoder. Ad ..	3	9	12	12	4	1½ hr.	4:10 P. M.
2. Oral.....	2	8	10	8	7	3 hr.	5:30 P. M.
3. Intravenous...		17	17	24	4	10 m.	4:10 P. M.
4. Rectal.....	9	17	16	11	5	3 hr.	5:15 P. M.

DIGITALIN (GER.)

Experiment 1. February 13, 1902. Dog. Weight, 12 Kg. Hypodermically.

	Time of Tracing.	Time of Administr'n.	Dose.	Rate in 20 Sec.	Ht. of Press. in Mms. Hg.	Amplitude of contrac-t'n in Cms.
Normal stage.....	9:10 A. M.		0.03	21 g.	34	29
Therapeutic stage..	11:00	9:20 A. M.	0.1	16	46	35
Toxic stage.....	1:00 P. M.	11:30		5	38	34

Experiment 2. February 14, 1902. Dog. Weight, 13 Kg. Per stomach.

Normal stage.....	8:30 A. M.			35	35	30
Therapeutic stage..	10:45	8:45 A. M.	0.08	22	49	38
Toxic stage.....	2:00 P. M.	11:30	0.2	7	55	40

Experiment 3. February 17, 1902. Dog. Weight, 11 Kg. Intravenously.

Normal stage.....	2:00 P. M.			19	38	35
Therapeutic stage..	2:30	2:15 P. M.	0.01	16	55	50
Toxic stage.....	3:40	3:00	0.1	8	46	45

Experiment 4. February 18, 1902. Dog. Weight, 13 Kg. Per rectum.

Normal stage.....	9:15 A. M.			25	44	27
Therapeutic stage..	11:30	9:20 A. M.	0.08	22	50	47
Toxic stage.....	3:00 P. M.	11:50	0.3	4	40	30

Experiment 5. February 19, 1902. 0.1% solution in water. Frog.

Normal I.....	2:00 P. M.			12
II.....	2:30 "	2:10 P. M.	5 drops	8
III.....	3:10 "	2:45 "	6 drops	2

Systolic standstill 3:15 P. M.

SUMMARY OF INFLUENCE ON HEART AND CIRCULATION.

	Systole	Increase in Diastole	Amplitude	Press.	Slowing	Rapid. of Reaction	Dias. Standstill.
1. Hypodermic...	1	5	6	12	5	1 hr. 40 m.	2:00 P. M.
2. Oral.....	3	5	8	14	13	2 hr.	2:30 "
3. Intravenous...	5	20	15	17	3	15 m.	4:00 "
4. Rectal.....	20		20	6	3	2 hr. 10 m.	4:15 "

DIGITALIS ASEPTIC.

Experiment 1. February 6. 1902. Dog. Weight, 11 Kg. Hypodermic administration.

	Time of Tracing.	Time of Administr'n.	Dose.	Rate in 20 Sec.	Ht. of Press. in Mms. Hg.	Amplitude of contrac-t'n in Cms.
Normal stage.....	2:00 P. M.			34	35	37
Therapeutic stage..	2:40	2:10 P. M.	2 CC.	58	58	64
Toxic stage	4:15	3:30	12	6	55	70

Experiment 2. February 7, 1902. Dog. Weight, 14 Kg. Administered per stomach.

Normal stage.....	9:25 A. M.			31	47	32
Therapeutic stage..	10:45	9:40 A. M.	5 CC.	16	55	48
Toxic stage.....	2:00 P. M.	11:30	25 "	11	75	45

Experiment 3. February 10, 1902. Dog. Weight, 13 Kg. Intravenous administration.

Normal stage.....	9:00 A. M.			31	43	26
Therapeutic stage..	9:18 "	9:10 A. M.	1 CC.	24	62	41
Toxic stage.....	11:10	10:40 "	5 "	5	52	47

Experiment 4. February 11, 1902. Dog. Weight, 11 Kg. Rectal administration.

Normal stage.....	10:00 A. M.		29	40	34
Therapeutic stage..	10:55 "	10:15 A. M.	24	50	50
Toxic stage.....	2:15 P. M.	11:45	9	32	45

Experiment 5. February 12, 1902 Frog.

Normal I.....	2:00 P. M.			11
II.....	2:20 "	2:10 P. M.	3 drops.	4
III.....	2:40		4 "	3
IV.....	3			2

Systolic standstill 3:10 P. M.

SUMMARY OF INFLUENCE ON HEART AND CIRCULATION.

	Systole	Increase in Diastole	Amplitude	Press.	Slowing	Rapid. of Reaction	Dias. Standstill.
1. Hypoder. Ad..	20	7	27	23	6	30 m.	4:45 P. M.
2. Oral.....	22	5	16	8	14	65 "	4:00 "
3. Intravenous...	8	7	15	19	7	8 "	11:50 A. M.
4. Rectal.....	5	20	16	10	5	45 "	3:30 P. M.

XXXVIII.—SOME DEVELOPMENTS IN THE THERAPY OF IODOFORM.

BY J. J. GAINES, M. D.,

EXCELSIOR SPRINGS, MO.

I. *History.*—Briefly speaking, iodoform was introduced into the therapeutic family in 1837, in London and Paris. I have no record showing its medical use at that time—it may have been utilized as a surgical dressing, or some ambitious inventor may have been looking for an ingredient for the construction of a Chinese "stinkpot" to be used for purposes of defense. I have no doubt of its giving perfect satisfaction when put to either use.

During the past three-score years, iodoform has varied in its degree of popularity, its extremely offensive odor making it the dread of both laity and physician. Scores of so-called odorless substitutes have clamored for recognition at our hands, but we are forced to admit their inefficiency as compared with the original. In this brief treatise, I shall embody a plea for the continued employment of this valuable drug, until science can offer us one which is of more value to us in the serious ailments of mankind, which I shall mention later.

II. *Characteristics.*—Iodoform is produced by the action of iodine in the presence of alkalies, upon alcohol, aldehyde, ether, acetic ether, methylic alcohol, and in minute quantities when acting upon carbohydrates or proteid compounds. Its formula, CHI. It occurs in yellow hexagonal crystals, with odor and appearance instantly recognized and unnecessary to describe. It is insoluble in water, yet imparts to it a perceptible odor and taste. Attempts to mask the odor will either fail, or deprive the drug of its specific action. I shall not attempt to discuss the means of combating the disagreeable odor, as I consider them valueless. Iodoform is volatile, and should be kept in well-stoppered bottles, and in a cool place.

III. *Physiological Action.*—In its original state, applied locally iodoform is mildly antiseptic, sedative, and in excessive quantity, toxic, the poisonous agent being iodine. Inter-

nally, in dose of less than 5 grains, it exhibits its local action plus a decided antiseptic and alterative effect—the two latter being the result of the rapid and easy liberation of large quantities of free iodine. It is readily acted upon by the gastro-intestinal fluids, and, so far as I have observed, without deranging them in the least, and liberating the highest per cent. of free iodine of any compound at our command. After administering 5 grains, we may note the appearance of iodine in the urine in two or three hours, and which will remain apparent for several days. This proves to us that easy saturation by the drug is followed by protracted elimination, giving us prolonged contact of the remedy with the disease.

IV. *Toxicology.*—There is so little difference between iodoform poisoning, and that of iodine, that it is unnecessary to discuss it. In the therapy as herein proposed, the problem of poisoning need not enter.

V. *Modes of Administration.*—The use of iodoform by inhalation is too important to be neglected. I have used an improvised and crudely arranged apparatus for the nebulization of iodoform emulsion, and have obtained the most happy results in the diseases where indicated, and I anxiously await the time when our inventive genius will give us a perfect nebulizer, especially one that will enable us to utilize heat in connection with the apparatus.

Internally, I administer iodoform in a well-fitting capsule. The dose I employ is rarely over one grain, and repeated as often as the case demands. Over-dose will disagree wih some stomachs, owing to the rapid liberation of iodine. If iodoform be given with subnitrate or salicylate of bismuth, or with prepared chalk, it will be better borne. The bowels should be kept gently open with Seidlith powder, or any of the magnesia preparations. Phosphate of soda is very useful in this connection.

Iodoform should never be prescribed with any compound of mercury, or with any opiate. In the former case a poisonous iodide will result and in the latter it is sure to derange the stomach by opposing effects. The chief drugs that I

have used as synergistic with iodoform are quinine sulphate, bismuth subnitrate and bismuth salicylate.

The common uses and modes of giving iodoform I shall not take your time in discussing; the well-known suppositories in rectal inflammations, the emulsion in chronic cystitis and the dressing in tubercular osteitis and other surgical affections, I am content to pass by with mere mention.

VI. *Therapeutic Uses.*—By inhalation I have relieved permanently the most obstinate forms of laryngitis and bronchitis, the acute forms of yielding in from 3 to 6 sittings of 10 minutes each, and this with a very crude home-made apparatus. Chronic forms yield readily with systematic inhalations and I believe from experience that iodoform in emulsion is a specific in the treatment of broncho-pulmonary affections, not excepting the tubercular, if taken in time. Again urging the production of a good thermo-nebulizer, I pass to the internal uses.

In sub-acute and chronic typhilitis, perityphilitis, and non-operable cases of appendicitis I have used iodoform in capsule, with salicylate of bismuth and quinine, three or four times daily, with very satisfactory results. I am accustomed to keep the bowels open in these cases with a mixture of olive oil and glycerine, and I find that the benefits of using these agents without the iodoform are not permanent and hence not satisfactory. Under treatment as outlined the infiltration and soreness disappear in from three weeks to as many months and a very grateful patient is almost always the result.

In tubercular peritonitis, after having failed with guaiacol, creosote, codliver oil and the hypophosphites, I have been entirely satisfied with the administration of iodoform and quinine sulphate. The hectic fever and sweats disappeared, and I have been able to discharge the patient in from one to two months able to return to his business. Just here I may say that I believe iodoform to be a specific in tuberculosis, if we but acquire the art of properly applying it. It is well worth our most earnest endeavor in combating this most serious enemy of mankind.

In tertiary syphilis and syphilitic cirrhosis of the liver, I have noted some good results, and I may say in this connection that I unqualifiedly condemn the use of mercury in any of the later stages of syphilis. What cannot be done with the saturation of the patient with iodine cannot be done at all. Iodoform has proven of no less value than iodide of potassium, and in many cases has acted more rapidly, giving lasting results.

In the great majority of acute or chronic diseases of the intestinal canal, whatever their origin, iodoform approaches the nature of a specific, being sedative, alterative and germicide. I have employed it in small dose (½ grain) in typhoid fever in the first and second weeks, and believe the severity of the later weeks was rendered much less. In all ulcerative diseases of the intestinal tract I use iodoform in capsule with some form of bismuth, and am rarely disappointed in results. In tubercular dysentery I am convinced that it is the only thing that approaches the nature of a specific.

In pulmonary tuberculosis I beg to append the following, clipped from the *Journal of the American Medical Association,* and which coincides materially with my own experience:

IODOFORM IN PULMONARY TUBERCULOSIS.

S. S. Cohen, in *Amer. Med.,* states that iodoform ranks as one among the limited number of drugs which have proved valuable in the treatment of tuberculosis. No other iodin compound, according to the writer, has yet been brought forward which takes its place. Its chief value, he states, is in cases presenting signs of infiltration without softening; but if limited softening be present in one portion of the lung, the drug is of service in combating the extension of infiltration elsewhere. To be beneficial in the highest degree iodoform should be given in gradually-increasing doses over a long period. To begin with, one-half a grain or less may be given thrice daily after meals and very gradually increased to the point of tolerance. In the course of two or three months a daily dose of nine or ten grains will have been reached, which may then be pushed more rapidly until fifteen grains daily are given. A good way to administer it is in capsule form (three to five grains) mixed with balsam of Peru as an excipient. If necessary a digestive agent may be added or a dose of essence

of pepsin may be given an hour later. If deemed advisable, arsenic iodide may be combined with the iodoform, they being chemically compatible and therapeutically synergistic. No one, according to the author, who has persisted in its continued use will forsake it for any of the transient fads of the day.

In chronic Bright's disease, where an iodide is indicated, whether syphilitic or tubercular, iodoform has proven of great value in my experience of ten years' frequent meeting with such disease. The alterative dose, ½ to 1 grain three times a day, is quite sufficient, and will be followed in the majority of cases by great relief in ten days to two weeks. I am convinced that iodine is the best renal alterative at our command, and iodoform the best combination. It is almost without an equal in the flatulence that is so often an accompaniment of uraemic poisoning, where salol is absolutely harmful. Indeed I have abandoned the use of salol as an intestinal antiseptic and substituted iodoform instead, and have no reason to regret it.

Having mentioned these fragmentary portions of the experience I have had in the somewhat unusual uses of iodoform, I submit to my fellow practitioners that we have in this pharmaceutical outcast one of the most powerful agents for the relief or cure of the most serious diseases of mankind. Its one objectionable feature, the unpleasant odor, is not a sufficient reason for its being discarded, and I realize that we are too liable, in our mad rush for new remedies, to forsake the old and tried for the new and many times dangerous compounds that are offered us.

I append a few cases in support of the foregoing arguments, which have been so imperfectly presented:

CASE 1.—Tubercular peritonitis. Patient aged 32, white, male, occupation farmer. Marked tubercular history. Diagnosis made prior to my seeing the patient by two prominent physicians with whom I concurred.

Symptoms Briefly.—Emaciaton, marked gastric disturbance, loose, irregular bowels, hectic fever and night-sweats. Spinal nerves are irritable, especially in the cervical region. Patient cannot turn the head without turning the entire body.

General neuralgia, which he calls rheumatism. Has had the disease about 8 months.

For six weeks I used guaiacol carbonate, cod liver oil, creosote in capsule and quinine. I then gave him a six-ounce bottle of syrup of hypophosphites, all without any amelioration of the symptoms, or abatement of the fever. I then gave him powd. iodoform, gr. xii, quinine sulphate, gr. L, bismuth salicylate, dr. iss M. et ft. caps No. xxiv. Sig: One to be taken every 3 hours. When he had finished this prescription he was more comfortable in every way and I renewed, giving grain doses of iodoform. I discharged this patient in six weeks, able to resume his work.

CASE 2.—Called in emergency to see Mrs. A———, aged 38, who was visiting the Springs in search of health, and whom I had never previously seen. Patient presented the following symptoms: oedema to above the knees; pulse, 140. Respiration rapid and shallow. Spasmodic vomiting, with intermediate convulsions, and coma. Axillary temperature, 105. (No previous fever.) General appearance of skin, icteric and dry. Pupils equal and responded feebly to light. Unable to protrude tongue and soon lapsed into continuous stupor. My diagnosis, uraemic coma. Prognosis, death at any moment.

The husband stated that no physician had ever given him an idea of what was the matter with his wife; that they had said it was baffling; might be cancer of the liver or "female complaint," and my information concerning the case was very meager at that time, so I treated symptoms as best I could. I discarded pilocarpine and gave tr. aconite root, in drop dose every hour, pouring it down the unconscious patient. In 20 hours the fever had abated and semi-consciousness returned. I catheterized the patient, getting about a pint of albuminous urine.

When able to swallow I gave her acetanilid, gr. 2, powd. iodoform gr. i, quinine sulph. gr. i; such a dose in capsule every two hours. I gave the iodoform to sterilize the bowel, which was extremely tympanitic and sore to the touch over abdomen. When fever subsided I excluded the acetanilid and continued the iodoform and quinine in the same dose while the patient remained under my care.

Results of Treatment.—Patient left her bed in two weeks; in four weeks walked about the town where she chose, the edema disappeared, and she left my care in seven weeks, able to attend to her housekeeping duties. Some albuminuria, however, remained.

I am informed that she employed an osteopath after returning to her home and some months later died—possibly of nephritis. I mention this case to show the apparent antagonistic action of the iodoform to the progress of the disease, arresting the symptoms almost at the fatal issue and postponing it for some months.

CASE 3.—Chronic catarrh of cecum, 20 years standing. Patient has been using the following formula for four months and declares that it gives him more comfort than any remedy he has tried: Bismuth salicylate, gr. 5; bismuth subnitrate, gr. 4; powd. iodoform, gr. i. M. Sig: One such capsule between meals and at bedtime. In this case I give no other medicine except to keep bowels regular with olive oil and glycerine.. Judging by his personal feelings the patient hopes for ultimate cure.

CASE 4.—Acute typhilitis, severe. Called in consultation, the physician in charge making diagnosis of acute appendicitis and asking for operation. I took the conservative course and used expectant treatment, opium and high rectal enemeta. When acute symptoms abated I gave quinine sulph., gr. 3; powd. iodoform, gr. iss. in capsule. Directed one such to be given every 3 or 4 hours and keep bowels easy with olive oil and glycerine. Patient recovered in six weeks and has been in perfect health two years. I do not claim a rapid result, but a complete recovery, leaving no sequelae.

CASE 5.—Severe subacute bronchitis, which resisted the usual remedies. Patient aged 40, marked tubercular history, his only two sisters and brother dying of the disease. This patient was not robust and exhibited severe cough, low fever and blood-streaked expectoration. (Unfortunately, I did not examine the sputum.)

Four inhalations of ten minutes each cured the patient without any other medicine. Inhalent, iodoform emulsion of the following ingredients, iodof., muc. acacia, oil terebenth, glycerine, castor oil, nebulized by heat. There has been no return of the symptoms for the past three years.

CASE 6.—Diagnosis, typhoid fever. Patient white, female, age 23. Axillary temperature at onset (about middle of first week when called), 105. The rose-colored spots were typical during the course, and the teeth were covered with sordes. Tongue typical of typhoid and diagnosis unquestionable.

When nature of disease was thoroughly apparent to me I gave a capsule containing powd. iodoform, gr. i; bismuth subnitrate, gr. iii.; quinine sulphate, gr. i.; such a dose every

ritation and mechanical action augment dyspnea and increase heart labor. To obviate this it will be sufficient in at least 50 per cent. of the cases to employ a purge of calomel of from 1 to 2 grains given in a single dose.

The further symptomatic treatment must relieve the dry, hot skin, and fever over 103 degrees suggests diaphoretics and baths. Pain is best treated by heat and counter-irritation of moderate severity.

Stimulants are to be commended as soon as gravity is assured. They should not be delayed, regardless of the stage. The fifth day must always be anticipated as an epoch affecting the outcome, and if stimulation is to be effective its avails must be secured at this juncture. The strength of the heart and respiratory centers should be maintained from the beginning and the nervous and muscular systems supported. After the fifth day has passed, in serious cases, without heart and nerve support, as strychnia and its associated groups, the place belonging to alcholics, ammonia and other diffusible stimulants, has been forfeited. The resisting powers of the individual will be fostered by stimulating treatment employed as soon as it becomes evident that therapeutic aid is required at all. The toxins are kept harmless in the larger invasions with ample temperature range by the use of alcholics, strychnia and ammonia. Cases in which the pneumonic invasion is slight and the infection extreme, demand early and constant stimulation.

Oxygen inhalation is indicated and should be used as early as possible, rather than reserved until the later stages. It is not only antagonistic, but defensive. In cyanosis it acts as an alternative to the last, if not indeed curative. When administered through a wash bottle, the water may be made a medicamentus medium, and the temperature of the inhalant made to conform to the comforts and needs. In danger from carbonic narcosis, oxygen acts with life-saving power.

Heart drugs are not often useful in pneumonia. The right ventricle of a good heart adjusts itself to the demands in harmony with the *vis medicatrix naturae,* and is oftener hindered than aided by heart goads. The symptom of syn-

cope is rare in pneumonia, and never occurs in the typical croupous form. The use of digitalis should be deferred until the evidences of heart weakening demand its employment. The use of digitalis in ordinary doses is a waste of good medicine and precious time. Twenty drops of the tincture given every six hours will accomplish more than five drops every hour. Pneumonia seems to have a counteracting influence upon this drug. Nitroglycerin is physiologically in line, as it tends to amplify the capillary area and bleeds the patient into his own vessels. Caffein may serve the double purpose of heart support and stomachic by lessening gastric and intestinal ferment and irritation, which digitalis is prone to produce.

Venesection is best resorted to in the first stage of young and robust patients, in whom the symptoms early show gravity, but in more moderate forms it may also be of avail. It becomes the only method of speedy relief to the overfilled heart. The amount of blood taken should not exceed 8 to 10 ounces, and an equal amount of normal salt solution may be injected. It has been suggested that a high leukocytosis may be promoted and controlled and the mico-organisms destroyed by injection, and hemoglobin displacement by a carbon prevented; but no method at present seems to offer this possibility other than repeated infusion and bleeding. Many are the methods of treatment of pneumonia, but the feature *de resistance* in all the most recent methods emanating from those whose clinical observations are associated with large and discriminating intelligence, favor the stimulating plan as a basis, and the symptomatic application of remedies according to the stage and emergency. These have been to some extent rehearsed, but this paper cannot compass so large a field as the complete discussion of the subject demands.

It has been the writer's wish that he might show to the faithful medical man an appreciation of his noble work amid the numerous discouragements incident to the treatment of croupous pneumonia, and to raise his feeble voice in defense of present methods and supervision, care and treatment, by calling attention to the present proficiency in diagnosis. He furthermore hopes that he has pointed out the failure in more

or less high places to recognize in statistics presented the evidence of unfairness, with the need for separating the real from the apparent increase in number of cases and mortality of pneumonia.

XXXVI.—PNEUMONIA.

BY WM. F. BARCLAY, M. D.,

PITTSBURG, PA.

Pneumonia has not been defined by writers except to uniformly ennumerate the symptoms of the disease, as observed and recorded by different writers. Dr. Dunglison, one of the ablest and most scholarly writers, has failed to define pneumonia, simply records the symptoms observed by him in studies of the disease. Pneumonitis is perhaps a word which comprehends sufficient meaning to amplify the etiology, pathology and treatment of pneumonia. No other disease has so many clinical forms, varied types, in its manifestations. Each individual case presents a subject for scientific research and investigation. The disease has plainly three stages, the congestive, inflammatory and resolution, modified by the severity of the attack and other conditions of life. The duration of the disease cannot be definitely defined. The disease is modified by climatic and other influences to a noticeable extent. Writers have made distinctions in describing pneumonia, which are essential in comprehending manifestations of the disease in individual cases. The disease presents epidemic and sporadic forms; the former as a rule is the more grave form and is usually more fatal in its termination.

Believing there is a close analogy between pneumonia and la grippe as to etiology, pathology and treatment, I shall attempt to demonstrate the importance of the main characteristics of these diseases in consideration of the belief that etiologic, pathologic and therapeutic conclusions differ but little in studies of the attack, symptoms and treatment of these closely allied affections. The exciting causes of pneumonia and la grippe are identical. The history, duration and prognosis of these diseases differ but little. Histological studies

of these diseases show clearly similar processes in their course. It is true that both diseases have their seasons; sporadic cases occur at all seasons of the year. The exciting causes of these diseases are of germ origin essentially the same. The diseases frequently coexist in the same individual. The affections differ in the structures of the organism affected. The mucous and serous membranes are involved with associated nervous manifestations of more or less grave import. Clinical observations of patients affected with pneumonia and la grippe, show similar conditions, as to general symptoms, in the different stages of these allied affections. During epidemics of pneumonia and la grippe it is frequently difficult to differentiate them. The initial stages are identical in duration, the conditions of temperature, circulation and disturbances of the secretions of the body. The same care and treatment will give the best general results in the management of the two diseases.

Mortality in pneumonia and la grippe does not materially differ. Pneumonia in epidemic form spreads from the Eastern coasts, so does epidemic la grippe. Mixed infection in pneumonia adds to the danger to life in prognosis of pneumonia and la grippe. I am not aware that a serum has been prepared and given therapeutic place in the treatment of la grippe. I would remark that anti-pneumococcic serum has been administered in the treatment of la grippe with as much apparent effect as in treatment of pneumonia. This apparent digression from the subject of this paper will be more and more appreciated in future studies.

The diagnosis of pneumonia is not difficult as a general rule, especially in epidemics of pneumonia. Sporadic cases at times give the practitioner considerable study in arriving at a correct conclusion. Traumatic and hypostatic pneumonia are to be considered in connection with injuries and other diseases, at times unsuspected and overlooked. Authorities consider pneumonia a subject with which the profession of medicine must depend largely on self-acquired knowledge, and individual resource. Watson, Hood, Dickson, Fogg, Aitken, Flint, Reynolds, Rogers and Pepper all seem to have

little difference of opinions and expressions on the subject of pneumonia.

The general conclusion derived from careful study of authors is that pneumonia is an alarmingly fatal malady which is left to the knowledge and professional acumen of individual practitioners of medicine. The prognosis is grave and the mortality very great under all circumstances.

The history of the etiology of pneumonia is comprehended in the conclusion that the disease was excited by extrinsic causes, thereby setting up an inflammatory condition in the lungs, but more recent observations show that the disease is superinduced by the introduction of a germ known as the pneumococcus. The etiology of pneumonia is determined by the presence of the pneumococcus, first described by Frankel. The systematic conditions which predispose the individual to an attack of pneumonia are low vital action at the time of infection. While cold, fatigue, exhaustion and other predisposing causes are known, it is evident that lowered vitality from diseases and abrasions of the skin and mucous membranes of the body facilitate infection. Recent observations have elucidated the inception of pneumonia in ways hitherto not understood. The germs of pneumonia when introduced into the circulation are discoverable in the solids of the entire organism. The complications which occur in the course of the disease are readily comprehended in a correct knowledge of the invasion of the germ, its speedy distribution and modification of the powers of life. The enervation of the heart clearly shows inhibition of nervous influence. Infection is not necessarily followed by the manifestation of the disease, as it is evident the powers of resistance inherent in the body eliminate the infection without serious disturbance or injury to the subject of infection. Infectious diseases are grouped in clinical studies, and the symptoms bear a close resemblance in the courses of different diseases, reminding the physician that the varied conditions demand discrimination and care in remedical recourse, lest harm and not good be done in our best directed efforts for the welfare of suffering humanity.

The infectious diseases were definitely classified long before the causes in germ origin were known and understood in scientific studies. The isolation of specific germs and their inoculation into the organism under suitable conditions establishes a basis of the causative of all infectious maladies. Transmission of the known cause and its modification is the foundation of serum therapy, of which we hear much and know little in scientific research. Commercialism robs the best directed efforts of scientific physicians of the benefits of their labors and humanity of the beneficence of the best attainments in scientific medicine. Ten thousand thieves, vampires and pirates besiege the ranks of scientific progress in medicine. The daily efforts of our lives are menaced within and without the profession of medicine by assumption of our best directed efforts for humanity.

Fraenkle's pneumococcus is the primary germ of infection in pneumonia; other germs are generated in the course of the disease.

The first stage of pneumonia is generally announced by sudden shock, difficulty in breathing, depression of the temperature, circulation, cough, hands and feet cold, anxious expression, drowsiness with pain on forced inspiration, and the partial or entire suppression of the secretions of the body. Delirium is usually present, especially after awakening from sleep. Percussion and auscultation usually indicate infallibly the presence of the congestion of the part or parts of the lungs which are implicated by the disease. The patient as a rule assumes the recumbent posture. The symptoms enumerated are usually present, although not invariably. The respiratory function is labored, and where used, usually superficial in character. The second stage of the disease is estimated when reaction sets in with increased temperature, pulsation, respiration and mucous rales, cough, rusty or bloody expectoration. The second stage is characterized by restlessness and delirium, dry, hot skin, and the usual symptoms of acute inflammatory conditions. The duration of the different stages of pneumonia have not been defined and are variable in different individuals. The third stage of pneumonia is of like in-

terest to the physician in its rational comprehension and management. The vital powers are in a state of excitement, overtaxed in performing additional labor, in elimination of the waste products of the body, the generation of toxic germs and the formation of new products increasing the infectious principles in the blood in the form of multiple infection. Multiple infection is characterized by exacerbations with alarming and depresssing secretion of the skin, which the usual conditions of hectic fever. The stage of resolution in pneumonia is a constant study of the symptoms which arise and require special care in that no careful observor concludes a certain prognoses, lest intervening complications arise and complicate the recovery of the patient. The untoward circumstances in pneumonia can not be rationally conjectured or foreseen, hence guarded opinions should be expressed until convalescence is established beyond reasonable doubt. The treatment of pneumonia should be continued and the patient kept under careful and studied supervision for at least six months after the severity of the attack is past, lest complications supervene. Comparatively no two cases are alike when clinically studied, nor is it always possible to determine certainly the extent of the disease or definitely define its invasion of the structure of the lungs and adjacent organs.

The varied pathological conditions in pneumonia complicate the disease in manifestations of definite clinical forms. The classification on careful clinical study of pneumonia by Rogers is well worth careful study.

CLINICAL FORMS OF PNEUMONIA.

First. According to the course of the disease: Absortive, speedily fatal, prolonged, double migrating (with successive foci).

Second. According to the morbid elements or symptoms: Inflammatory, adynamic, ataxic, bilious pneumonia (with icterus).

Third. Acording to localization: Pneumonia of the base, of the apex, central, massive, pleuro-pneumonia.

Divisions based on the subject: First, according to age: Pneumonia of children; of the aged.

Second, according to previous state of health: Pneumonia of chachectics, of drunkards, of the obese, of diabetics, of bronchitis, of the tubercular, of those suffering from malaria.

Third, according to coexistence of another infection: Pneumonia of typhoid fever, of erysipelas, of acute articular rheumatism, of la grippe.

The pneumococcus has been discovered in the secretions of the eye in cases of acute conjunctivitis. I have copied this classification with additions from Rogers' Introduction to the Study of Medicine. It is not unreasonable that authors conclude treatises of pneumonia inconsiderately and evidence of a disease which requires unusual care and treatment. It is evident that pneumonia prepares the organism for the implantation of the germs of tuberculosis. Annually thousands die of tuberculosis who otherwise would not have been infected were it not for a previous attack of pneumonia. The prostration following pneumonia is very great and the exhaustion frequently superinduces various diseases which result in permanent invalidism or death. Careful clinical study teaches that no definite time can be ascribed to the duration of the stages of pneumonia. The age, constitution and other conditions of life, have much influence in determining the course of the disease.

It is important to understand and teach the patient that no disease requires more care in its management during its duration and during convalescence, nor can the patient be intelligently dismissed for months, until the most careful examination fails to reveal the presence of anything in the condition of the patient which may require care and treatment.

The pneumococcus is certainly known to be the cause of pneumonia, and its introduction into the organism is evidently through air inspired, invading the system by the air passages. Other avenues of invasion are evidently possible. The course of the disease superinduces conditions which generate other toxic germs and multiple infection is apparent in studies of pneumonia. The duration of pneumonia is so indefinite that care and caution cannot be too carefully observed in the expression of opinions. The disease is one of varied compli-

cations and incomprehensible manifestation in its duration and termination.

Specialists are curiously not directing the profession or the public to their attainments or skill in the care and treatment of pneumonia. Conscious of the difficulty in even concisely arranging a brief logical introduction to the study of pneumonia, I shall dismiss the discussion for a short study of the treatment of pneumonia. It is apparent that the discussion of pneumonia will elicit and elucidate much which will prove instructive and of inestimable advantage to the profession of medicine. The treatment of pneumonia is one of the subjects which invites the interest of every practitioner of medicine. The profession is committed to no fixed conclusion, but each member pursues a plan of treatment based on the pathological conditions comprehended in individual cases of pneumonia and its varied complications. No definite course of treatment is accorded to any living practitioner of medicine. On the other hand, a large number of eminent physicians declare the expectant plan of treatment will show as good results as any other in the management of pneumonia.

I believe a rational treatment is based on the comprehension of the immediate causes of death in pneumonia as concluded in a large number of death reports in the city of Pittsburg. Heart failure and exhaustion stand out as the immediate cause of death in ninety-eight per cent. of all reported deaths in a circumscribed area of almost one million people. A small percentage give secondary causes or complications as immediate causes of death. I assume that all treatment and medication which enervates the organism and weakens the action of the heart are injurious. I have learned from experience and from clinical studies that a most decided course of medication is indicated in the treatment of pneumonia and that a like course of treatment in la grippe robs the disease of its terrors. First, it is important to consider the surroundings of all patients suffering from pneumonia. Rest and quietude are essential, and they can only be had in bed. The atmospheric conditions of apartments should be carefully studied as

to the avoidance of changes conducive to variable temperature. The body should be protected by warm clothing.

Medication is of paramount importance and should be most carefully considered and judiciously applied. The administration of the mild chloride of mercury combined with milk sugar is an essential in the preliminary treatment of pneumonia. It is frequently apparent that the disease is modified and aborted by this course of treatment. Counter irritation of the chest was in former times advisable. Blisters and irritating embrocations of the skin were considered in the line of helpful adjuvants in treatment of pneumonia. The application of an exciting embrocating liniment has seemed to be of advantage in relieving pain and affording relief in controlling symptoms which cause restlessness and discomfort. The application of warm poultices was seldom omitted in the management of the early stages of pneumonia. Experience has demonstrated that moist applications are of doubtful utility. A new form of external treatment is comprehended in the application of earth preparations, such as is known as antiphlogistine. The equable temperature of the surface of the parts of the chest over the inflammatory portions of the lung diseased are advisable. The use of cold in treatment of pneumonia is advised and practiced, with reports of advantage in controlling the acute stage of the disease. I am well aware of the remedies prescribed in treatment of pneumonia, and it is with considerable hesitation that I commend the course which has seemed to me of most advantage. The use of nux vomica, strychnia and whisky has modified symptoms and given strength to the patient in surmounting the dangers which attend the disease. Opium in the form of the deodorized tincture has less apparent danger than any other form of narcotic. Dover's powder, combined with quinine is a favorite combination in treatment of pneumonia. All coal tar products are to be avoided on account of their detrimental action upon the heart. The diet should be plain and nutritious; that which is easily and readily digested is preferable. Aconite, veratrum viridi and other remedies which act upon the heart and the ar-

teries are advised, but should be, if at all, used with great care and precaution.

Croupous pneumonia in which the air cells are involved is a morbid process, identical with that which attacks the mucous memberane of the larynx in tracheal and laryngeal croup. The congestion of the parts involved is no doubt the cause of a constriction in the air passages, of a spastic contraction intensified by nervous and other influences which excite the muscles which control contraction and expansion of the air tubes.

DISCUSSION.

DR. ROBERT H. BABCOCK, OF CHICAGO.—Mr. President: Subjects of so much importance as those considered by the two essayists should elicit a good deal of discussion, and there are so many points which deserve our attention that I am at a loss which one to consider first. Moreover, the acoustic properties of this room are so bad, that I fear I have lost many of the points in the two excellent papers we have just heard.

The name pneumonia is not a satisfactory one, for many reasons. I cannot agree, however, with Dr. Barclay in considering pneumonitis a preferable term, since that limits us to the conception that pneumonia is an inflammatory process of the lung, pure and simple, and we cannot, therefore, perhaps at present, select any term which is better than pneumonia, since it does not commit us to any definite conception of the disease. I belive the confusion which arises in the classification of pneumonia comes from the fact that there are many etiological factors concerned in the production of this disease. If the day comes, and it surely will come, when we can make a diagnosis of pneumonia from a strictly etiological standpoint, much, if not all, of the confusion now pertaining to the subject will be done away with.

We know that we have a pneumococcus pneumonia; we know that we may have a tuberculous pneumonia, one due to the tubercle bacillus. We may have a streptococcus pneumonia, and we may have a pneumonia due to the influenza bacillus. Therefore, I cannot agree with the last author in his statement, which I have understood to this effect, that pneumonia and la grippe are essentially the same in many cases, because if the doctor has seen cases of la grippe which were manifested by a pneumonia similar to the pneumonia of pneumococcus infection, it has been my experience that there are cases in which the influenza bacillus and the pneumococcus were both responsible for the disease, and that the striking

clinical peculiarities of the cases were due to the predominance of one or the other micro-organism. The diagnosis of pneumonia is, for this same reason, difficult. In the acute croupous pneumonia of the young, healthy adult, diagnosis is rarely difficult; yet the same disease is difficult in the child, is difficult in the aged, and in the feeble, for the reason that certain peculiarities will modify the clinical features. Many practitioners depend (as I find in consultation practice), for diagnosis of pneumonia, upon a rusty or prune juice expectoration. I would like merely to emphasize the fact, that the striking feature of the sputum of croupous pneumonia is a stickiness or tenacity rather than its color.

When physical signs are obscure, as they frequently are, it has seemed to me I have always found much aid in a careful study of the pulse and respiration ratio, since in ordinary pneumococcus pneumonia the pulse tends to be relatively low in proportion to the height of the temperature; whereas the respirations tend to be relatively high, and I find this helps me out in many cases of senile pneumonia—the undue acceleration of the respiration as compared with the pulse.

Physical signs will leave us in the lurch, as remarked by Dr. English, if we depend upon an examination of the anterior portion of the chest, since pneumonia is so frequently limited to the lower lobe, and we know that the lower lobe, in many individuals, especially at middle life, is posterior. We find, therefore, sometimes no signs of pneumonia of the lower lobe anteriorly.

The prognosis of pneumonia depends upon the nature of the infection, the age of the patient, and other factors. In children, and in the young adult, with acute croupous pneumonia, pure and simple, that is, pneumococcus pneumonia, the prognosis is relatively good. When I say in a child I don't mean a young infant of less than a year, but in a robust child and in a robust young adult, acute pneumococcus pneumonia offers a relatively good prognosis. It is when the disease is mixed or complicated by some constitutional disease of feebleness that the prognosis becomes relatively bad. In each case, I believe, one should carefully study the pulmonic second sound with reference to the strength of the right ventricle, because failure of the right ventricle is, in my opinion, indicated by growing feebleness of the pulmonic second sound, and right ventricle failure is a very serious factor in pneumonia. The heart failure is due, however, not to the mere mechanical overtaxing of the right ventricle, but to the in-

fection acting on the myocardium and on the nerve centers, as stated by Dr. English.

In the treatment of pneumonia, I would especially emphasize the value of diffusible stimulants when toxemia is intense and is affecting the vaso-motor centers, as shown by cynanosis and by cardiac feebleness, and under these diffusible stimulants, (I do not include alcohol, although alcohol, in my opinion, is a cardiac stimulant, in small doses, and not too frequently given.) When alcohol is given in too large doses, it becomes a cardiac depressant. Nitroglycerin is not admissible when cyanosis is present, for the reason that by increasing vaso-motor paresis it only intensifies and augments the evil already due to the infection and involvement of the nerve centers.

DR. ENGLISH (closing the discussion on his part).—I have been very much pleased with the discussion on this subject. Dr. Barclay has called your attention to the general forms of pneumonia, and I was much interested in the classification. The one point that seems to me to need elaboration, especially in a meeting of this character, is that of traumatic pneumonia. Pneumonia sometimes results from an injury, concussion, a blow, or a fall on the chest. I have found in my consultation work with physicians that they were surprised that such a thing could arise. Fifty per cent. of the physicians in consultation under such circumstances are wonderfully taken back to receive from me the assertion that a fall upon the back, as from a coal wagon, or something of that kind, may produce pneumonia. I had such a case a few days ago before I left Pittsburg. I was called in consultation with a physician who was ready to question such a possibility. In a busy place like Pittsburg, where the mills are constantly running, and the streets are full of vehicles, and well supplied with rapid transit cars, these accidents are liable to take place daily, and a number of cases of traumatic pneumonia occur. Kansas City might be a good second in that respect to Pittsburg. Suffice it to say, cases of this kind that come under my care occasionally reach the courts. If a street car strikes a man it hurts him, and it often happens that some one is thrown off the street car, sustaining some injury, and it is possible that it may produce pneumonia, or conditions which are followed later by lung trouble. Then, in all probability, the case will be settled in court. It often happens that the physician is asked by the lawyers upon either side of the case to know if such possibilities can arise; that an injury may

lead to pneumonia in a year or two after an accident, and one must be very careful and guarded in answering such questions. A number of cases have come to me through the counsel of the Street Railroad Company, and they have been settled, on my advice, because it is hard to disprove these injuries, no matter if they appear in the form of phthisis later.

DR. BABCOCK.—I believe one authority says that traumatic pneumonia occurs in four per cent. of the cases.

DR. ENGLISH.—That is strong evidence. I want to say further that I was extremely pleased with the remarks of Dr. Babcock. He has given us one of the most pleasing and interesting discussions I have ever heard. The fact is, Mr. President, I have never attempted a discussion of pneumonia before a medical association before, but the subject is of great interest to me.

DR. BARCLAY (closing the discussion.)—I appreciate all that has been said. My impression was, before I prepared the paper, that it might elicit a free discussion. I was not aware that Dr. English contemplated preparing a paper on this subject until he called to see me within a few days, and asked me to read my paper to him, as he intimated there might be some danger of conflict of opinions. I do not believe that there is much danger in an intelligent discussion of pneumonia, of any conflict of opinion.

The observations I have made with reference to the similarity between pneumonia and la grippe have been made with care, and if any of you care to study these two diseases, and make a note of the duration of the congestive and inflammatory stages, with the stage of resolution in la grippe, I feel quite certain you will concur in the opinion that I expressed, that there is a close analogy between the two affections, and that pneumonia is very often associated with la grippe. Of course, Dr. Babcock has suggested mixed infection. No doubt that observation is correct. It has seemed to me, from an experience of thirty-six years, that there is very much difference between pneumonia in cities and pneumonia in the country. I believe that all physicians who practice medicine in the country will bear out this observation, that pneumonia is more fatal in the country than it is in the cities, and for obvious reasons. In cities we are able, as a rule, to give the sick better care than can be given them in the country, because the houses are more carefully constructed, and it frequently occurs in the country that there is practically no ventilation, except that which is afforded by the chimneys and doors.

When I began to practice medicine, I was taught by Dr. Flint, of New York, that venesection, if the case was seen early, was the most important treatment that could be given, that is, when other conditions were considered, and for many years I practiced venesection very largely amongst the country people, and where I succeeded in applying this treatment very well. I am well satisfied that it did a great deal of good, and very often, as far as I could observe, it aborted the disease. Of course, we were advised then to give carbonate of ammonia. I gave it frequently in the treatment of pneumonia until I was satisfied that it did more harm than good, and for many years I have not prescribed carbonate of ammonia. As a rule, I think it does harm.

DR. BABCOCK.—In what way, Doctor?

DR. BARCLAY.—It has an unpleasant action upon the digestive powers, and you know, Dr. Babcock, how important it is to take care of the digestive powers in the treatment of pneumonia. The action of carbonate of ammonia has seemed to me to be this: It produced excitement and relaxation of the skin; sometimes I have thought this depressing action came from sweating. I know just how difficult it is to point out any treatment in pneumonia that can be followed out in any series of cases. It is important to study each case carefully and adopt that treatment which seems to be indicated. I stated that pneumonia was an alarmingly fatal disease, and while others have stated that it was not so fatal, my observation has been that if I could avoid attending patients suffering from pneumonia, I would never attend any more. Of course, I believe that children recover from pneumonia, if they can be controlled, better than adults.

In preparing this paper I consulted some twelve or fifteen different authorities, in order that I might be able to give you some of the important facts which would be useful in a discussion of the methods of treatment, but I frankly admit that there is nothing in any authority I have studied, except perhaps that of Rogers, that has at all satisfied my mind that the disease is thoroughly understood. In making postmorten examinations of cases of pneumonia, I have discovered that both the pleura and the diaphragm were involved, and I am satisfied that where the diaphragm is complicated the termination is almost invariably fatal.

DR. ROBERT H. BABCOCK, OF CHICAGO.—I should like to say a few words more in connection with this subject, because the question of treatment upon the appearance of cyanosis is so important. In my previous remarks I advocated

the use of diffusible stimulants, but I would like to say that a professional friend of mine in Chicago, of wide experience, has used with great success, and I trust his observations are correct, the suprarenal extract in the form of adrenalin, administered hypodermically. I do not stand here to advertise or advocate the preparations of any special house. The effect of the suprarenal extract upon the vaso-motor system is such that it promises good results in the treatment of this very grave stage of croupous pneumonia, and I think it is worthy of trial.

DR. EDWIN WALKER.—How much do you give, Doctor?

DR. BABCOCK.—Personally, I have not used it, although I fully intend to do so. I believe the hypodermatic dose is five minims of the 1-1000 solution.

XXXVII.—AN ATTEMPT TO OBTAIN A UNIFORMLY ACTIVE, STERILE AND NON-IRRITATING PREPARATION OF DIGITALIS FOR SUBCUTANEOUS AND INTERNAL ADMINISTRATION.

BY E. M. HOUGHTON, PH.C., M. D.,

DETROIT, MICH.

Since the time of Withering, digitalis has been the subject of innumerable papers. Still there are many questions pertaining to the pharmacy, chemistry, pharmacology and therapeutics of the drug that remain unsettled. Chemists and pharmacologists agree that the active constituents of the drug which produce the desired action upon the circulartory system are glucosides, but different workers are not agreed as to the identity of these glucosides. Thus, Schmiedeberg in 1874 obtained three glucosides: digitalin, digitalein and digitoxin from digitalis leaves, all of which possess a characteristic digitalis action upon the heart, but differ in degree of activity and solubility. Along with these glucosides he found a saponin-like body which he named "Digitonin." Kiliani, a little later, working along the same lines, found that

three hours. Bowels kept easy with saline water. Turpentine stupes over abdomen, antipyretic cool sponging.

Under treatment temperature steadily declined from the first, and did not exhibit the usual erratic curves so prominent under other methods of treatment. Tympanites gradually abated and gave little cause for concern. At the end of the second week I considered the general toxemia under perfect control. There was no delirium and no dicrotic pulse, but a barely noticeable subsultus.

I withdrew the iodoform capsule at the middle of third week with a maximum temperature of 99 degrees, and completed my work with small doses of bismuth and zinc sulphocarbolate.

I do not claim for this an abortive treatment of typhoid fever, but I believe it will keep off the dangerous phenomena so often exhibited and render the patient's situation safe, much more comfortable and materially shorten the attack. And I have never known troublesome sequelae to follow this treatment.

In conclusion, I may say that I considered all the foregoing cases to be severe in character and to be crucial tests for any form of treatment. And I submit that, adding the *internal* uses of iodoform to its many external applications, it is one of the most *useful* (if not ornamental) agents of the Pharmacopeia at our command in treating serious disease.

DISCUSSION.

DR. WM. F. BARCLAY, of Pittsburg, Pa.—Mr. President: The paper just read was very instructive to me on account of the good results that were obtained by the author from the administration of iodoform. I do not suppose any of us have objected to the use of iodoform except on the ground of its odor. Almost all patients object to its odor, and I know of no way of masking or disguising the odor of iodoform, although I have tried various means to do so.

The essayist spoke of the inhalation of iodoform. I have used iodoform in cases of laryngeal tuberculosis with better results than any agent I have ever employed. I have found that it can be dissolved very nicely by using olive oil. I have formulated a spray solution that I like very much. I use iodoform in from ten to fifteen grains to the ounce of albolene. The albolene should be free from acid. I add to that thirty drops of oil of pine needles, and ten drops of guaiacol.

I use an ordinary atomizer, one of the simplest that has been devised, called the "Magic." I use a medium-sized No. 2, and I find that patients can inhale the iodoform without any unpleasant effects, and the results are better in the treatment of laryngeal tuberculosis than from any other agent I have used.

I have used, as the essayist has, iodoform in cases of tuberculosis of the bowel, with very gratifying results.

The essayist did not mention one point that has occurred to me, namely, that it almost invariably impairs the digestive apparatus. Perhaps he has succeeded in combining it with other agents so as to cause very little interference with the digestion, but my experience has been that it always impairs the appetite. To me the paper has been a very instructive one, and I think that by working along the line of combination we may be able to combine iodoform with other agents, so that we can use it for purposes of inhalation, also for internal and external application in other diseases than tuberculosis.

Dr. H. J. Stewart, of Chicago.—I would like to ask the essayist whether he has ever encountered a patient who was particularly susceptible to iodoform poisoning during its administration? Shortly after I began the practice of medicine, I had occasion to do a curettement of the uterus and a trachelorrhaphy on a patient. Her temperature was normal at the time I operated. In less than twenty hours after the operation, having used iodoform gauze in packing the uterus and vagina, I was called to the hospital in great haste, and discovered that my patient was suffering from iodoform poisoning. Her temperature was 104 degrees; pulse between 150 and 160. She was very nervous and excited. It was my first experience with iodoform poisoning, and I was much confused in ascertaining what was the matter. I knew it was not sepsis, because it was too short a time. After withdrawing the iodoform gauze, the temperature and pulse declined, the nervous symptoms subsided, and the patient was all right in six or seven days.

Dr. K. B. Richardson, of Kansas City, Mo.—With reference to disguising the taste of iodoform, I find many times the patients object to it, as it goes into their mouths rather than as it rises from their stomachs afterwards. I have found in those cases, in which I wanted to obtain a local effect on the throat, that if I put it in a capsule and dropped the capsules into beeswax, hermetically sealed, it disguised both the taste and odor, so that the members of the family and

neighbors could not detect the odor, and the only disagreeable thing to the patient was the taste as it arose from the stomach afterwards.

DR. GAINES (closing the discussion).—I will say that it requires deft handling to administer iodoform successfully. In many instances we must not tell patients that we are giving them iodoform. I have never known iodoform to disagree with patients' stomachs in the form in which I administer it, where the bowels move once a day. The only trouble I have in its internal administration is that there is apt to be regurgitation or belching of gas, and then the patients catch the odor; otherwise they do not know that they are taking iodoform. I have never had it disagree with a single patient except where I have given it with opiates, or gave codeine with it, and then they would either spit it up or it would regurgitate and cause the patient annoyance.

In answer to the question of Dr. Stewart, I have used it in many cases of tubercular osteitis, using as high as ten per cent iodoform gauze, and never saw a case of iodoform poisoning.

XXXIX.—DISEASES PRECEDING AND FOLLOWING THE ABUSE OF ALCOHOL.

BY T. D. CROTHERS, M. D.,

HARTFORD, CONN.

The latest and most authentic statistics show that over ten per cent. of all mortality is due to the abuse of alcohol, and fully twenty per cent. of all diseases is traceable to this cause; also that over fifty per cent. of insanity, idiocy and pauperism springs from this source. All authorities agree that from seventy-five to ninety per cent. of all criminality is caused by the abuse of alcohol. These and other well authenticated facts indicate the necessity of a more exact medical study of alcohol and its effects and influence on society and the individual.

The inebriate is one who drinks spirits to excess, either continuously or at intervals. When studied clinically by exact means and methods, there are often found symptoms and evidences of disease long before the alcohol was first used. In about thirty per cent. of all inebriates before the craze for

alcohol and subsequent inebriety, there were incipient or well marked forms of paresis and other disease states. Among these early disease symptoms can be traced degrees of dementia, syphilis, trauma, local inflammations, the presence of toxines and bacteria products, with reflex disturbances due to tumors and the pressure of foreign bodies on the nerves. These conditions precede the use of alcohol, and after it has been used other well marked diseases are clearly traceable, but the first diseases are not recognized and therefore seldom studied as a condition or predisposing and exciting causes.

One of the most prominent diseases which precede the use of spirits to excess is general paresis. This occurs in so large a number of cases as to attract attention, although no special study has been made of it to the present. Common examples are seen in early and middle life in almost every section of the country, in men who are actively engaged either struggling for wealth and position and living strenuous lives or in men of the leisure class without business or purpose in life.

The first symptoms apparent are those of gradual physical exhaustion and forms an invalidism that is indistinct and vague. Changes of conduct and manners with unusual hopefulness and satisfaction, or irritability, are proofs of the mental state. With these come neglect of trifling things and indifference to the opinion and wishes of others.

The patient is boastful, credulous and dogmatic in little matters, is slovenly in appearance and unreasonable in his thought and conduct. Such persons suddenly begin to use spirits to excess for no particular reason that can be traced. The paretic symptoms of exhaustion and mental exhilaration become masked and changed, and with the physical debility delusions of strength and egotism grow rapidly. In some instances the psychic symptoms decline with the increase of debility, in others they merge into strange obsessions, but are always of an exalted type. When spirits are used, a great variety of complex symptoms appear. A large number of these cases have a clinical history of syphilis somewhere in the past. This confirms the often repeated assertion that paresis follows from this disease more frequently than from

any other. From my experience a large number of inebriates, who, while under the influence of spirits have marked paretic symptoms, have suffered from syphilis before the drink craze was developed. Examples of this class are seen in the following: An active, hard-working, temperate merchant at forty-four became exalted and intensely egotistical, with well defined symptoms of exhaustion and physical feebleness. He talked loudly and asserted great personal superiority, acted recklessly, made rash promises; yet showing muscular trembling and great debility from any exertion. Suddenly he commenced drinking to excess and died two years after from cerebral hemorrhage. The history indicated an attack of syphilis, for which for many years he had been treated at intervals.

A second example was that of a mechanic, who, after a slight attack of indigestion, was prostrated and suffered from great muscular weakness. This he attributed to a stroke of electricity from lightning, which occurred over a mile from where he stood and evidently only made a strong mental impression. After a time the mind began to be exalted and delusions of wealth were aroused. He thought he had invented a machine that would revolutionize the world. All unexpectedly he began to drink to excess and was an inebriate from this time.

In his history there was evidence of an attack of syphilis two years before the final breakdown. Most of these cases are not recognized as paretics. The exaltation and egotism of the patient may be merely an intensification of a normal mental state, or it may occur as an anomaly and have some basis in the circumstances of the patient; it may be concealed from all but intimate friends. When it is associated with physical defects, failures of memory, changes of habits and loss of previous accuracy in matters of business and social relations, it is clearly paresis.

A noted physician for several years grew more and more exalted in his conception of ability and faith in himself, and during this time a marked deterioration of general health was apparent. He was unable to work as before, could not sleep at night; at times showed great excitement and feebleness, but attributed these symptoms to insignificant causes and believed that he was in the best of health and had superior knowledge of all matters in his daily visits. He became an inebriate and died in an insane asylum.

A prominent lawyer, temperate and vigorous, suddenly

entered the field of politics and showed extreme excitement and reckless ambition in his struggle for position and place. He then commenced to drink to great excess, and was for a long time a chronic inebriate.

There are many reasons for believing that many of the strange instances of persons who, after a lifetime of consistent temperate living, suddenly manifest mental exaltation and delirious ambitions, trying to accomplish some new object and purpose, who then become inebriates and die, are examples of paresis. Closely allied with this and probably belonging to the same class of degenerate psychoses are the dementias, who may take on any form of mental and physical derangement and debility, sometimes marked by exaltation, at others by melancholy and depression.

These states precede inebriety, sometimes very marked, in others masked and not noticed. Persons who suddenly become alarmed at the prospect of disease and death, and who display extraordinary anxiety to find drugs and means for relief from their fears, frequently end in inebriety; then the mind may concentrate on efforts to get rid of the drink craze, and as soon as this is accomplished go back to drugs again, and later become alarmed and make other attempts. These are cases of dementia.

Another class of cases, who in middle life are greatly alarmed at the signs of approaching age and become possessed with the mania to break up the weariness, exhaustion and nutrient defects, are practically dements. They, too, become inebriates after an unsuccessful effort to avert the natural decline of age. Next to paresis, syphilis and dementia, states of trauma or obscure injuries to the nerve centers more often precede the attack of inebriety. Examples like the following are common:

A heat or sunstroke, followed by invalidism, nervousness and great debility, develops into inebriety a year or two later. Blows on the head, concussion and shocks to the nervous system from mental or physical causes, are followed by indigestion, insomnia, exhaustion and inebriety. Influenza, attended with great physical and mental depression, has frequently merged into the drink craze. Many examples may be cited

of persons who, after prolonged wasting diseases, have become inebriates. Evidently, some condition of exhaustion or derangement of the co-ordinate centers has acted as an exciting cause to inebriety. Incipient tuberculosis, which has not been recognized, has in many instances been marked by an impulsive craze for alcoholic drinks.

In a large number of inebriates, tubercular deposits are found in the apex of the lung and cicatrices, where tuberculous ulcers have healed. In a family with hereditary tuberculosis, the appearance of inebriety is an unmistakable sign of degenerate psychoses ready to burst out upon the slightest exciting cause. Usually the subsidence of the drink craze is followed by the return of the tuberculosis, though in some instances where tuberculosis is present the use of spirits, either as a beverage or medicine, rapidly precipitates the growth and fatal issue of the case. In other instances, alcohol seems to check and retard the tubercular deposits, but always at the expense of lowered vitality and increased feebleness of the resisting powers. It has been pointed out by many authorities that inebriety and tuberculosis are allied diseases. I have published many instances of their association and interchangeability, each preceding the other. Families of consumptive ancestors have children who die of inebriety, and children of inebriates very commonly develop tuberculosis. Neurasthenia and states of profound exhaustion very commonly precede inebriety; thus a business or professional man will suffer from intense fatigue and general indisposition without any special disease being apparent and after a few months of ineffectual effort for relief will suddenly use spirits to excess and become an inebriate.

A number of instances have been noted of persons who went abroad suffering from neurasthenia and found great relief from the wines at the table on the continent, and who on returning drank strong spirits, then after one or two intoxications became confirmed inebriates. A noted clergyman, who fell into a general decline, went to Germany and was persuaded to drink beer, the effects of which were so

pleasant that he continued its use. Later he used wine, strong spirits and finally became an inebriate.

In such cases, there is a preliminary period which, no doubt, is very common; in others, the drink craze comes on abruptly and follows a profound intoxication. Many of these cases of neurasthenia are very susceptible to the toxic action of spirits and often become profoundly affected by very small doses. If the intoxication merges into coma with pleasing delirium, a certain bias and direction is given to the disease tendencies, which develop into inebriety at once.

Where the neurasthenia has been of long duration, inebriety is always very pronounced, but when the disease is recent the person may sometimes use spirits for months before addiction is developed. Nervous and physical exhaustion are always favorable soils for the development of inebriety.

Dyspepsia and general disorders of nutrition are very common diseases preceding inebriety. Usually victims of this disease become inebriates from the use of drugs containing spirits. Some of the popular bitters on the market have developed inebriates in many instances and are positively dangerous. The narcotic action of alcohol in covering up the acute symptoms of the patient are mistaken for relief and cure. Soon strong spirits are demanded and the impulse to drink is irresistible. Women, through these means, are very often victims of inebriety. Many of the digestive drugs on the market contain alcohol and their popularity depends on the narcotic action of spirits.

Rheumatism in its various forms and varieties frequently precedes the use of alcohol, as in dyspepsia; the very grateful effects which follow from the use of alcohol increases the desire for its further use. Instances are noted in which the alcoholic desire for its use breaks out with great intensity and the symptoms of rheumatism subside, but as the term rheumatism describes a great variety of maladies the relation between the two cannot be very closely differentiated. Many of the sufferers from acute organic degenerations and low forms of chronic inflammations have distinct attacks of alcoholic excesses. Usually these are of short duration and are

followed by more profound symptoms of disease. In one case, carcinoma provoked the most intense alcoholic desires, and although the disease was increased by its use the craze continued until death; in another, cancer of the rectum was followed by the same craze for spirits. Many cases have been reported of uncontrollable inebriety, which were evidently due to some reflex disturbance. In one instance, a wound of the tibia, which did not heal readily, brought on an attack of inebriety. The patient drank four years, when a surgical operation removed the dead bone, after which he fully recovered.

In another instance, a physician received a head injury and drank to great excess for many years, then recovered from an operation which removed a spicula of bone resting on the brain. A remarkable case was that of a noted inebriate, whose conduct and drinking habits came into public notice many times in a few years. At his death, the post-mortem revealed the fragment of a ball received during the war of 1861. It had become encysted and pressed on a nerve center, causing an irritation for which drink was the most grateful narcotic. Tape-worms have been recognized as exciting causes, and their removal has been followed by a subsidence of the drink craze. Severe attacks of pneumonia and typhoid fever have left forms of invalidism which have merged into inebriety without any other exciting causes.

Instances are very common where some sudden profound exhaustion has been the starting point of inebriates, as in the following examples: A man in good health barely escaped from death by fire in the hotel where he slept, and a few weeks after he drank to excess. A physician, who by mistake administered the wrong medicine, was so overwhelmed with grief at his mistake that a few weeks later he began to drink and died from inebriety.

The effect of sudden loss of property and commercial disaster is followed by inebriety. While these conditions are not particularly diseases that are recognized, they produce states of exhaustion which develop in the direction of manias and insanities, marked by the drink symptom. This is only an out-

line of a great variety of diseases and disease states which precede alcoholic excesses. The diseases which follow the use of alcohol are more easily recognized, and yet they are seldom regarded as specifically due to this one cause. Probably, dementia in its varied forms is the most prominent general discase which follows in all persons who use spirits to excess. This dementia comes as a natural sequence of the protoplasmic poisoning by alcohol, the most marked symptoms of which are the gradual failure of the higher brain centers, the increasing feebleness of the moral and ethical conceptions of life, with loss of truthfulness and disregard to the claims of right and wrong and duty.

With this there is organic weakness, with loss of judgment and memory, and neglect of the ordinary care of the body. States of paranoia, marked by mild delusions and strange unreasonable conceptions, appear.

The finer shades of insanity and mental perversion, with credulities and skepticisms, are very common. The constant strain from continued anesthesia and hypersthesia of the delicate cells of the brain soon causes loss and injury, which is noticeable in the changed mentality, and inconsistencies of thought and conduct. Probably all cases of alcoholics suffer from degrees of dementia, although many of the activities of the body are performed automatically, hence the real condition is unknown. Another disease may be said to be constantly present in all persons who drink to excess, namely, arteriosclerosis. The first effect of alcohol, increasing the heart's action, driving the blood to the brain with great rapidity, is comparable to a continuous concussion along the delicate arterioles of the brain. The high tension produced by the sudden increase in the column of blood forced to the brain and surface is followed by low pressure and deranged nutrition.

The vaso-motor paralysis, destroying the activity of the nerves which regulate the blood circulation, still farther adds to the difficulty, and as a result local inflammation, with fibrous deposits and alternate thickening and thinning of the muscular coats, occurs. The appearance of the circulation of the blood in the face, no doubt, represents the state of the arteries in

the brain. This is still farther confirmed by the frequency of cerebral hemorrhage and death in these cases.

Another confirmation is the local palsies of which the muscles of the face and body show symptoms. The tension of the pulse shows obstruction of the circulation, and the failure of the brain to work harmoniously or consistently is explained by the frequent shocks of blood currents forced to the brain, and the loss of power to adjust this circulation. The anemia and defective nutrition, which spring from the damaged circulation and supply of blood, is another evidence. No one can drink spirits long without having forms of arterio-sclerosis. Another common disease, which is not very well recognized, is atrophic-sclerosis of the liver. The liver seems to suffer most severely from the action of alcohol. The hepatic cells are primarily affected, becoming fatty and degenerate, their function being deranged and they undergo a form of necrosis. The stronger the alcohol used, the more specifically it acts on the liver, particularly when taken on an empty stomach. Alcohol is one of the most prominent causes of atrophic-sclerosis of the liver.

Hypertrophic sclerosis is considered a disease due directly to alcohol, and following inflammatory states of the stomach and infectious diseases. In the latter diseases, the gall ducts are more or less complicated and jaundice and ascites are common symptoms. The so-called beer drinker's liver is hypertrophic sclerosis, while the spirit drinker has more frequently atrophic states. Either one or other of these conditions is commonly found in all drinkers.

Next to these diseases of the liver are inflammation of the nerves or peripheral neuritis. Until recently these affections have been called gout and rheumatism, and were supposed to come from other causes than alcohol. It is now known that they are distinct inflammatory states of the nerve fibers and terminal ends, associated with erosion and degeneration of the structure.

The stiffness, cramps and pains of the extremities, both hands and feet, associated with cramps and pains, are called rheumatism, but are due specifically to the poisonous action of alcohol. This toxic action extends up to the nerve points, pro-

ducing palsy and general debility, associated with local irritations of which gastritis and hepatitis are common, ending in death from low stages of delirium.

Recently, it has been found that arsenic taken in impure beer produces the same conditions. Fortunately, all persons are not affected alike, but in the later stages degrees of neuritis is very commonly present.

Nephritis is another low grade of inflammation that is sure to follow the excessive use of spirits. Wine and beer drinkers suffer most commonly and in all cases there are inflammatory conditions and functional disturbances. It is estimated that fully thirty per cent. of all inebriates have nephritis most prominently before death, but this is always complicated with sclerosis of the liver, gastritis and other forms of low inflammation.

Gastritis is another common local inflammatory state, which is always associated with other degenerations and local inflammations. While the attacks are usually acute and of short duration, permanent impairment always follows. This is seen in the nutrient disturbances which follow. Both the liver and stomach become diseased and the function of nutrition is very sensibly impaired, and such inebriates die from pneumonia and cerebral hemorrhage.

In pneumonia, paresis is present, so that the disease is called pneumo-paresis. These cases terminate in from twenty to thirty years. The cerebral hemorrhages are likewise very rapid in their action. The so-called heart diseases, which are mentioned in the death certificates, are usually atrophic conditions following the general failure of the nervous system, with profound organic anemia.

In all these cases, there is starvation and toxic poisoning. The direct action of alcohol on the hemaglobin of the blood diminishes the power of conveying oxygen and this strikes directly at the nutrition of the body. The toxins of alcohol not only destroy nutrition and increase waste matter, but diminish the elimination process.

Some of the conclusions which will be apparent from this clinical study are that, at least one-third of all inebriates have

suffered from some disease present before alcohol was first used.

In these instances the use of alcohol is a symptom of a prior rather than the cause of the subsequent disease. The degeneration from alcohol intensifies and formulates the conditions existing before. Often the disease which existed before continues with greater intensity, or is masked and diminished. Paresis may sometimes be held in abeyance for awhile until the use of alcohol is ended.

States of dementia may be covered up and ascribed to other causes. Infectious diseases may be checked for a time or changed in form. Another conclusion which should be remembered by the practitioner is to study the cases of inebriety to ascertain the conditions which preceded the use of spirits. Having found these, the prognosis and therapeutics are matters of more or less exactness.

Second, we should remember that inebriety, alcoholism and dipsomania and other toxic insanities are very likely to follow certain diseases, and in some instances can be practically prevented. After the inebriety has appeared, then the question of the form of insanity and the tendency of the degeneration is most prominent.

The exact disease which seems to be most actively stimulated suggests therapeutic measures and means most practical. Finally, the study and treatment of these diseases, which either precede or follow the use of alcohol, will prevent much of the present empirical speculation and point out means of prevention and relief unknown at present.

DISCUSSION.

Dr. John Punton, of Kansas City, Mo.—Mr. President: Such an important paper as this should not go by without some discussion. The title of the Doctor's paper practically covers the entire field of medicine. I think Dr. Crothers is to be congratulated on reducing such an enormous subject to a small compass, when he can cover the facts and present them as he has done in a twenty-minute paper. The point that occurred to me was this: The essayist led us to believe that the moral to be drawn from the paper was, if we wish to escape disease, we must leave alcohol alone. I have always understood (I may be mistaken) that a certain amount of alcohol

can be taken and assimilated by the human organism without any special detriment to its organs. If that be true, the question arises, How much can any one man or any set of men take without reaching a pathological state? I would like to have him, in closing his remarks, enlighten me on that subject.

DR. CROTHERS (closing the discussion).—I can only say, in answer to Dr. Punton's question, that it would require a long time to determine how much or how little alcohol a man can take without producing a pathological state. If a little is bad, how can we find the amount that is good? The safest course to pursue is to consider all spirits bad, and not use them. One great mistake which is made is in regarding alcohol a stimulant, when it is really an anesthetic always and even in small doses.

XL.—TOXIC AMBLYOPIA FROM WOOD ALCOHOL.

BY J. W. SHERER, M. D.,

KANSAS CITY, MO.

On September 27, 1898, I was consulted by J. H., aet. 32 years, a Swede farmer then living in Ellsworth County, Kansas, who complained of dim sight.

Previous History.—Prior to July, 1897, he had always enjoyed good health with the exception of a few minor ailments. A few days before the Fourth of July, 1897, he went to town and purchased an indefinite quantity of cheap alcohol. On the Fourth this was mixed with an indefinite quantity of water and other materials, and the mixture used for purposes of conviviality in celebrating the national holiday. Four persons who shared the courtesies of hospitality all drank more or less deeply.

The perpetrator, J. H., informed me that the next day he was very sick with nausea, vomiting, vertigo, headache, sweats and partial paralysis and stiffness of the lower limbs, which lasted three days. About 24 hours after potations began his vision began to fail and in another 24 hours his vision was about as it has remained ever since. The other symptoms disappeared except that the limbs are still somewhat stiff.

Present Condition.—R. E. vis., 1-60 by eccentric fixation 10 degrees above the normal fixation center. L. E. vis., quantitative perception of light only.

Objective Examination.—Externally both eyes appeared normal. Both pupils were about 5 m.m. wide and reacted to

light, but not to accommodation. With the opthalmoscope the media were found clear in both eyes. The nerves looked greenish white in both eyes, with some atrophic cupping more pronounced in the left, in which it was about 2 D. In the right eye the disk showed greater atrophy in the infero-external or macular segment. Both fundi were unmistakably redder than normal and both presented considerable mottling. In the left eye there was a deposit of pigment at the lower edge of the disk, and in both the scleral ring was abnormally distinct. The refractive error in this patient was slight.

The visual field of the right eye was somewhat contracted and there was a central scotoma, the distinguishing characteristic of all toxic amblyopias. In the left eye the visual field was also somewhat contracted, but blindness was absolute only at the center of vision. All over the remainder of the field light could be recognized and located correctly. The central scotomata in both eyes were absolute.

The second of the boon companions did not drink very deeply and recovered in a few days. He said that he first became dizzy, then nauseated; that he vomited and had a bad headache. Then his eyesight became very dim. The dimness of vision lasted a few days, and then began to improve. He thought that in three weeks it was as good as ever. Upon testing, however, I found the keenness of vision reduced. R.E.V., 6-9; L. E. V., 6-12. The ophthalmoscopic findings are of no interest, as no pathological anomalies were revealed.

The third sharer of the joys and sorrows of celebration became very ill, with retching, delirium and unconsciousness. He died in 48 hours.

The fourth person became totally blind in two or three days, did not recover and was not seen by me.

The fifth case was seen at the request of Dr. Parker of Kansas City in midsummer 1901. The patient, a woman 30 years of age, had three days before been suffering severe pain from menstruation and having no other medicine at hand took a small medicine glassful of burning alcohol. Instead of relieving her it made her worse, causing dizziness, nausea, vomiting and, if possible, aggravating her headache. Twenty-four hours later her vision began to fail and on the third day, when I saw her, the vision was reduced to the perception of large moving objects in the peripheral field. The center of vision was occupied by an absolute scotoma in both eyes.

The visual field was somewhat contracted, but the vision seemed equally good in all parts of the remaining field. The pupils were rather wide, about 5 M.M. Although they re-

acted rather sluggishly to light, no reaction to accommodation was obtainable. The left eye was attacked slightly more severely than the right. The media were clear in both eyes. The retinal vessels showed no alteration in calibre. The capillarity of the disks was a little increased. This patient was immediately removed to her home in Kansas and the further progress of the case remains unknown to me.

Toxic amblyopia, or poison blindness, is characterized by central scotoma. In all of the 25 cases of toxic amblyopia due to wood alcohol that have been hitherto reported the scotomata have been absolute and generally permanent, although sometimes, as in one of the cases reported above, there may be some improvement.

The symptomatology of toxic amblyopia as now established appertains to the chronic variety, or that occurring in persons habitually exposed to the action of the poison. In such persons the symptoms come on gradually, and are at first capable of being entirely relieved. The conditions in such cases is called retrobulbar neuritis and a typical central color scotoma forms. It occupies the core-space and its shape and progress are diagnostic. The color scotoma affects but one color, red, at first, but one by one they all become involved until the central scotoma becomes absolute. The accompanying gradual failure of the power of vision is beautifully shown in the detailed account of three cases due to *tobacco-alcohol* published by Wm. Zentmayer about a year ago.

In the cases from wood alcohol the attack seems to burst with explosive violence corresponding to the greater virulence of the poison. I believe that the processes may be properly classified together as acute and chronic. In the toxic amblyopia of wood alcohol there is color blindness, central scotoma and but very moderate contraction of the field, the same as in the chronic. Moreover, if we compare the size of the dose of wood alcohol to the duration of exposure to the chronic poisoning and make allowance for the varying factor of resistance we shall find results which correspond to an astonishing degree. Thus, one of the cases reported above recovered from the diminutive dose taken. This will correspond to such of the numerous cases of toxic amblyopia as get treat-

ment early and have good resistance. From this stage to that of total blindness, or death from either cause, there are all gradations.

Ophthalmoscopically, too, there is a correspondence. Early there is no visible change in the fundus. In the chronic variety the diagnosis is made from the history, the failing vision and the central scotoma, there being no fundal signs. Later, atrophy of the disk, more especially in the segment downward and outward from the center, is indicated by whiteness. This is followed by shrinking of the vessels. The same is true of the acute forms. To illustrate, I would cite the case of Wood and Wurdemann. The patient inhaled the poison in July, 1899, and was seen by Wood in November of that year, and by Wurdemann in October, 1900. It was found that atrophy of the optic nerve had occurred between the times when he was seen by these two gentlemen. Anomalous cases, with hyperemia of the nerve-head and hemorrhages, have been reported for chronic varieties only. Demicheri has shown that color defects may occasionally occur in the periphery in chronic cases. These are usually sector shaped and relative.

In this connection I wish to speak of multiple neuritis, or the alcoholic neuritis, of general medicine. This has been found to have a variety of toxic causes and I am prone to associate the peripheral optic neuritis and the peripheral multiple neuritis in somewhat the same category. In this connection I wish to point to the paralysis of the lower limbs in one of the cases reported above. It is to be greatly regretted that no study of the case was practical at the time.

The pupil has been said by Wurdemann to be "more or less immobile." It will be observed that in two of my cases the pupils were large and responded weakly to light and that no reaction to accommodation could be obtained. Whether this was because of the blindness, the subject being unable to fix and focus the object, or to a break in the reflex arc. I do not know. T. Lauder-Brunton, speaing of toxic amblyopia, says: "The condition of the pupillary reflex is just the converse of the Argyll-Robertson phenomenon." In other words, the pupil reacts to light and not to accommodation.

Despite the large amount of study which has been done upon the pathology of these conditions this is not yet definitely settled. The subject has been examined from every possible view point by such able observers as deSchweinitz, Sachs, Landry, Holden, Nuel, Parsons, Fisher, Treitel, Baer, Schoen, Birch-Hirschfeld, Massins, Druault, Samelsohn, Vossius and Uhthoff. Not to tire you with a detailed account of the studies suffice it to say that the most advanced thought at present is in favor of a retinal origin and a neuritic sequel. The work of Birch-Hirschfeld confirms that of Holden. Holden gave wood alcohol to dogs and rabbits and although there were no ophthalmoscopic changes, distinct degenerative changes were demonstratable in the ganglion cells and macular layers of the retina. This was attributed to diminished blood supply due to a vaso-constrictor effect on the blood vessels. The trophic centers of the optic nerve fibres being thus removed, the degeneration of the fibres must inevitably follow. No evidence of inflammation could be demonstrated in the nerve fibres. Parsons, Langley and Fisher carry their analysis farther and consider the papillo-macular bundle to be especially involved on account of its scantier blood supply and add to the vaso-constriction of the arterioles and paralytic action of the poison upon the synapses of the cone fibres, or of the inner granule layer, or both. On account of this and other corroborative testimony I believe that it may now be regarded as pretty well established by histological proof that the earliest lesion in toxic amblyopia is to be found in the ganlion cells of the retina and that consecutively the nerve fibres break down. This agrees with the clinical observations better than the old theory of a primary neuritis; for we know that vision may fluctuate with the condition of the cells. In chronic toxic amblyopia vision may be markedly improved by amyl nitrite, rest, good hygiene, etc., or decline just as markedly under reversed conditions. This points decisively to a nuclear, not to a neuritic, source of the trouble.

It has been proved by at least 20 autopsies that the papillo-macular bundle of fibres undergoes degeneration to a greater degree than the remainder of the nerve in most cases.

It is estimated that 7 per cent. of all ocular diseases consist of amblyopia of toxic origin. Of a total of 138 cases from all sources collected by deSchweinitz I find upon analyzing them that 46 per cent. were due to alcohol; 16 per cent. to tobacco and 32 per cent. were due to the combined action of tobacco and alcohol. Thus 94 per cent. are due to the wilful abuse of alcohol or tobacco or both. The remaining 6 per cent. are distributed among a long list of substances such as carbon bisulphide, iodoform iodine, potassium iodide, potassium chlorate, dinitro and trinitro benzol, benzine, hydrocyanic acid, potassium hydrocyanide, coal tar products, anilines, arsenic, mercury, lead, phosphorus and several mineral acids.

When the exhaustive book of deSchweinitz on the toxic amblyopias appeared in 1896 there had been but one case reported due to wood alcohol, that by Mengin.

Wood alcohol, CH_3OH, is sold under a variety of names, such as methyl alcohol, burning alcohol, Columbian spirits and naphtha. The French call it esprit de Bois, the Germans, holzgeist.

It is ordinarily made by the destructive distillation of wood, but can be made from marsh gas, CH_4, by certain reactions whereby one atom of H is replaced by one molecule of hydroxyl, OH. It is a colorless liquid with an etheral odor and a sharp burning taste. If pure it is said to burn like ethylic alcohol, but with a paler, less luminous flame and with less heat. However, the few specimens which I have tested have burned with a tinge of yellow in the end of the blaze somewhat suggestive of sodium in the flame of the Bunsen burner. It is miscible with the ordinary menstrua in all proportions and is a powerful solvent of resins, sulphur, phosphorous, etc. For detecting it the color test of potassium permanganate proposed by Young is delicate and reliable. The toxicity has not been determined, but I find that 5 ounces have caused death in one adult male and blindness in another. Also three ounces have caused blindness in an adult male. The amount taken by the woman reported above was about 1 ounce.

Of the 25 cases hitherto reported 23 resulted from ingestion and two from inhalation of the poison. The latter were as grave as the former and the symptoms of dizziness, nausea and frontal headache, followed by great reduction of sight and central scotoma, were the same. The subjects were workmen who were varnishing the interior of a vat with shellac dissolved in wood-alcohol. The exposure lasted from four to six days respectively before the poison caused its victims to succumb.

In addition to its many industrial uses this drug is, I am informed, sometimes employed in making medicinal tinctures. This, of course, is criminal and should be detected and punished. I have personal knowledge of one case in which the patient, a child, was slightly poisoned by a remedy dispensed in a menstruum containing wood alcohol. The attending physician promptly discovered the crime and averted the disaster.

I can scarcely bring myself to speak of treatment for a disease in which the services of the occulist are so signally limited to diagnosis and prognosis. I know of no therapy that has as yet been proposed for the amblyopia from wood alcohol. Reasoning deductively from the treatment which has been proposed for toxic amblyopia in general, I would suggest strychnia, potassium idoide, mercury bichloride and nitroglycerin.

SUPPLEMENTAL ADDENDUM ON PATHOLOGY.

Some months after writing the foregoing paper the researches in the pathology of toxic amblyopia of Marlowe of Syracuse, N. Y., were published.

His work is extensive, thorough and exhaustive. In quinin amblyopia his findings were absolutely confirmatory of those of Ward Holden. Synchronously with the onset of the amblyopia there were chromolysis of the retinal nerve cells, (dissolution of the chromotin), edematous dilatation of the pericellular spaces and vacuolation and degeneration of the ganglion cells. Several weeks after the destruction of the cells the nerve fibres begin to degenerate. These changes are

associated with a profound anemia of the retina due to the quinin intoxication.

In the study of the retro-bulbar neuritis from alcohol, tobacco, felix mas and other poisons a series of twenty experiments were performed in which felicic neuritis was produced and the pathology carefully examined. It was found that in severe cases absolutely all of the nerve fibres had melted away and had entirely disappeared by the end of the third day.

The axis cylinder dissolves and is absorbed and the neurogliar alveolus which contained it afterwards becomes distended in some places and filled with a homogeneous substance, which yields the reaction of hyaline material. There is no leucocytal emigration at this stage, but a little later when necrobiotic change of the neuroglia occurs small cells and epitheleoid cells appear in great numbers.

In this early stage the small spaces around the nerve and included within the neurogliar sheath are obliterated by the swelling of the nerve fiber. There is papillitis from swelling of the nerve fibers without any trace of dropsy of the intravaginal spaces of the nerve sheaths.

After the distruction of the nerve fibres secondary changes in the neurolgia appear in the form of softening, with the appearance of small cells and epitheliod cells or by necrobiosis. Around the areas of neurogliar softening there is a proliferation of neurogliar fibrillar fasciculi, with hypertrophy and progress to new formation and permanent condensation. These fibrillae are all longitudinal and become firmly pressed together. They are especially noticeable in tabetic atrophy and constitute a true fibrillar gliosis.

It must be admitted that in felicic neuritis the primary effect is exerted upon the nerve fibres, but it is likely that the nerve cells are simultaneously attacked. The condition is one of acute parenchymatous neuritis. A perfect analogy is found between the retro-bulbar neuritis of alcohol and tobacco and felicic neuritis, both depending upon the same anatomic lesions, viz: acute parenchymatous nephritis.

The possibility of the lesion being primarily an intersti-

tial neuritis is absolutely rejected, and evidently upon sound ground anatomically.

There is an immediate overgrowth of the interstitial connective tissue, but it is always secondary to the destruction of the nerve fibres. Marlowe considers it certain that quite diverse forms of optic neuritis are certainly of a parenchymatous nature, the nerve fibre and the nerve cell being primarily attacked. These optic neuritides are tabetic, retrobulbar, optic neuritis-infectious, microbic, optic neuritis—simple, white atrophy and some forms of papillitis.

DISCUSSION.

DR. JAMES M. BALL, OF ST. LOUIS, MO.—Mr. President: I am sorry Dr. Dudley S. Reynolds is not here to open this discussion. I want to say I highly appreciate Dr. Sherer's paper. It is carefully written; he has presented the results of investigations which are of value to us, and he has given us a highly scientific contribution to the subject of toxic amblyopia.

He is correct in regarding the beginning of pathological changes in the ganglion cell layer, if we believe in the researches that have been made comparatively recently. Among the toxic amblyopias, perhaps the one of most interest to the general practitioner, is that in which tobacco and alcohol are supposed to be simultaneous causes. One very interesting form of toxic amblyopia which he mentioned in his paper is quinin blindness. I happened to have had in the City Hospital in St. Louis a case of unmistakable quinin blindness several years ago, which was reported in the Ophthalmic Record. Vision was diminished to perception to light following the administration of sixty grains of quinin within a period of about twenty hours. Perhaps that amount of quinin would not be considered large in a country where there is a great deal of malaria. On examining the patient with the ophthalmoscope, I found the entire fundus astigmatic, the vessels being reduced to minute threads. The pupils were enlarged and irresponsive to light on convergence. This patient was placed in the recumbent position; quinin was discontinued; he was given a nutritious diet, and strychnia. He recovered with useful but not with normal vision. His vision was perhaps 20-40 for each eye.

I do not know that I can add anything farther to the paper of the essayist or to this discussion, except to say that I shall be glad to read it when it is in print.

DR. HUGH T. PATRICK, OF CHICAGO.—I have been greatly interested in this paper. I regard it as an unusually good one. A point which appeals to me, not being an eye man, is the matter of degenerative neuritides. The fact that such cases are called neuritis very often leads one astray. As a matter of fact, the neuritides from alcohol and arsenic and the like and those following diphtheria, typhoid fever, and other infections, are not cases of inflammation of the nerves at all. They have been known to be pure degenerations for a long time, but the name neuritis has been adhered to, and that has carried with it the idea of inflammation. Practically all the cases of multiple neuritis are instances of toxic neuritis, and are not cases of neuritis, but of neural degeneration, and these cases of toxic amblyopia naturally fall into this class.

Another point in the Doctor's paper which is interesting to me is this, that cases of experimental neuritis from filix mass show a disappearance of the fibers several days before the cells disappear. I have had an idea that some cases of neuritis are secondary degenerations from involvement of the cell body from which the fibers spring, or of which they are really a part, and others are really peripheral neuritis or peripheral degeneration. The facts adduced by Dr. Sherer seem to support that view. I do not see any reason why we should suppose they are always the same. Some poisons, as generally expressed, have an elective action on certain nerve structures. A better way of stating it, perhaps, would be, that certain nerve structures are peculiarly vulnerable to certain poisons. On the same principle, the peripheral part of the neuron should be the first to suffer from some poisons; from others, the neuron body would degenerate first and this would involve the secondary degeneration of the fiber, which is a part of the cell only. This is very easy to comprehend as regards the optic nerve. We know the optic nerve is not a nerve in the ordinary sense, but is made up almost entirely of commissural fibers; the optic nerve does not originate in the brain and terminate in the retina, but most of it originates in the retina. The neuron bodies are in the retina, and the nerve fibers terminate in the brain. A case in which degeneration begins in the retina must follow along the optic nerve. The reciprocal degeneration occurring sometimes in the retina and sometimes in the optic nerve is analogous to that which occurs in other nerves of the body.

XLI.—PRIMARY ACUTE GLAUCOMA.

BY FLAVEL B. TIFFANY, M. D.,

KANSAS CITY, MO.

Glaucoma is an affection of the eye whose etiology and pathology are wrapped in a halo of obscurity. The name, even, is a misnomer, for although in this disease the pupil of the eye sometimes takes on a green color, this is by no means always present, nor is there any tumor of the eye, as the word *oma* would signify; therefore the name glaucoma is misleading and does not in any way indicate the real disease. Like cataract, myopia and other affections of the eye, the name was given in preophthalmoscopic days, hence its little appropriateness today.

It is a difficult matter to define the disease known as glaucoma. We cannot say that it is a peculiar case of cyclitis, for it may be less or more; nor is it uveitis, for as a rule it only involves a part of the uveal tract. According to the most careful research it is found to be a disease involving the ciliary muscle (the power of accommodation), ciliary processes, ciliary ligament, and the ligamentum pectinatum iridis, with an occlusion or stenosis of the Canal of Schlemm, and in consequence there is much retention of the fluids of the eye, causing an increased intraocular tension. The increased tension is the main symptom of acute glaucoma. Among other symptoms is an acute pain, a lancinating, throbbing pain, which will make the strongest man quake and shriek with agony. This severe pain is referred to the ciliary region and is undoubtedly due to the involvement of the sensory branch of the ciliary nerve, which passes through this region on its way to the cornea. Another symptom is dilation of the pupil which is caused by partial paralysis of the sphincter pupillae, or rather the branch of the nerve governing this part of the iris. Another important symptom is the halo of prismatic colors seen about a lighted candle, gas, or oil light; which phenomenon is caused by the diffraction of the rays of light passing through the swollen periphery of the lens,

(the pupil being widely dilated). There is also periodic dimness of vision, caused by the ebb and flow of the fluids governing the intraocular tension. The field of vision is narrowed, especially the peripheral portion, because of the retina being involved at its ora serrata, which is in close proximity to the ciliary muscle, seat of the disease. The symptom that it pathognomonic is the cupped disc with pulsation of the arterial centralis retinae where the latter winds over the edge of the disc. The cup is at the foramen opticum and it, with the arterial pulsation, is due to the increased intraocular tension brought about by the occlusion of Schlemm's canal. Acute glaucoma, when I first commenced the practice of ophthalmology, a quarter of a century ago, was a very common disease. At that time, although my practice was limited, I used to meet with it comparatively often; today, with at least 50 per cent. larger practice than at that time, I scarcely ever meet with it as a disease *per se,* yet I am practicing in the same locality as formerly. It is not my intention in this short paper to discuss the etiology or pathology. I only wish to suggest a cause in the majority of cases which to my mind is quite conclusive, viz., that acute glaucoma is an affection of the power of accommodation in which the ciliary muscle, the suspensory ligament and the canal of Schlemm are involved, and that the disease is nearly always found in hyperopic eyes, or eyes of hyperopic astigmatism or of presbyopia. Why was the disease so frequent 25 years ago and so rare today? Twenty-five years ago we scarcely knew that there was such an anomaly of refraction as hyperopia, much less hyperopic astigmatism. When Cohen made his examination of school children's eyes as to the error of refraction, he only took into consideration myopia. It is only within the last quarter of a century that the knowledge has come to us of the large per cent. of hyperopes compared with myopes or emmetropes for that matter. Twenty-five years ago, there were few opticians who knew there was such a thing as hyperopia and none, comparatively speaking, were able to correct a case of astigmatism; hence the majority of these cases went with-

out correction, overtaxing the power of accommodation, which in the hyperopic eye is constantly brought into requisition whether the person is using his vision for far or near objects, and so the dire sequences, such as glaucoma, cyclitis, resulted. Today the country is teeming with opticians and many of them good ones. Scarcely is there a hamlet but has a scientific, well equipped optician, besides there are the itinerant occulists visiting the rural districts. The result is that these cases of error of refraction are corrected and glaucoma is forestalled, making acute glaucoma today a rarity. There are other causes, however, which occasionally provoke glaucoma. Too strong a solution of sulphate of atropia is thought by some occulists to cause this disease, and if so the pathologic conditions are similar to those of glaucoma induced by hyperopia uncorrected. The pupil being dilated, the iris is drawn back into the iridian angle, obstructing or blockading Schlemm's canal, causing retention of the aqueous humor of the eye. The secretions from the iris and other parts of the uvea is a physiological function, the secretion being constant. So should the flow of the aqueous humor through the canal of Schlemm be constant. If the flow is obstructed the retained fluid becomes stagnant, perhaps contaminated, if not infected, and so the prophylactic provision so wisely inaugurated by nature is thwarted and pathological changes take place. In my experience I have only seen one case where I could, with any degree of proof, indict a mydriatic as cause of this disease and this is the following case, which in conclusion I will report. In this case both eyes were simultaneously affected, developing into acute glaucoma.

Mrs. J. A. D., aged 40, resident of Salisbury, Mo., consulted me July 21, 1902. The division was very dim, not being able to count fingers. There was a great amount of photophobia, the eyes not being able to tolerate any light. The pupils were dilated oblongly, the greater diameter being in the vertical. The intraocular tension was increased to —3; the eyes being of stony hardness. While looking at a lighted candle Mrs. D. noticed a halo of prismatic colors, the red being the outer and the blue the inner circle. She gave the

following history: Some four years ago an itinerant oculist instilled a solution of atropine into the eyes which produced severe pain, lasting several hours, and since then she has had frequent recurrences of similar attacks. These would last for a day or two at a time and each attack left the vision dimmer. A sister standing by remarked that she herself had had a similar experience after having had the drops put into her eyes, which might suggest a family idiosyncrasy. In this case I made a broad iridectomy, making the insicion slightly within the sclera just posterior to the limbus, taking care to cut the iris well back to its ciliary attachment so as to remove that part at the iridian angle and reopen Schlemm's canal, thus establishing drainage and so reducing the intraocular tension. I also administered pilocarpine ¼ grain twice a day and instilled eserine sulphate one-fourth per cent solution into each eye once a day. The object of the eserine was to contract the pupil and draw the folded iris from the region of the canal of Schlemm and the outer angle.

DISCUSSION.

DR. JAMES M. BALL, ST. LOUIS, MO.—Mr. President: There are certain things in this paper to which I must take exception, and particularly to some of the pictures projected on the screen. The essayist spoke of the first picture being a representation of the normal fundus of the eye. I have never seen the normal fundus represented in the living eye like this picture. Of course, this may be due to a rough illustration, but it is far from representing correctly the normal appearance of the fundus.

In regard to the etiology of glaucoma, while, of course, there are numerous theories in regard to it, and while these theories seem to consider it to be due to a blocking of the iris-angle, yet, back of all this adhesion between the iris and posterior surface of the cornea, occluding the parts in the region of the iris-angle, there must be something. What is it? There are a number of facts which may be mentioned in this connection, but unfortunately they do not permit of a logical explanation. There is no logical chain connecting one fact with another. The recent investigations of Uribe-Troncoso, of the City of Mexico, show that in the aqueous humor of the glaucomatous eye there is a greater amount of albumin than is found in the aqueous humor of the normal eye.

Some years ago I reported the pathologic changes

found in cases of glaucoma from which I removed the superior cervical ganglion of the sympathetic nerve. These changes were found to be extensive, and they are an overgrowth of the connective tissue and atrophy of the nerve elements found in the sympathetic. In many instances we must regard, I think, glaucoma as a disease due primarily to some alteration in the sympathetic nervous system. How often do we find glaucoma following in a patient who has sustained great financial loss, or who has met with some great disaster, and how can we account for the changes that are present unless we call to our aid the sympathetic nervous system?

I know the essayist has limited his paper largely to acute glaucoma, but frequently the line of demarcation between the acute and chronic forms is not well marked. Cases due to neglected iritis or intra-ocular tumor, in which there is a blocking of the drainage apparatus, will suffice to explain all the symptoms. In the so-called idiopathic form there is something behind it.

As regards the halo symptom, it is absolutely useless in making a diagnosis. Patients complain of a halo when there is mucus spread over the cornea.

Cupping of the disc has been mentioned as one of the pathognomonic signs of glaucoma. I must take exception to the statement of the essayist when he says, if I understood him correctly, that spontaneous arterial pulsation does not occur except in glaucomatous eyes. I have seen spontaneous arterial pulsation in the retinal vessels in cases of exophthalmic goitre, and in cases of aortic aneurism.

I must take exception to the word hyperopic; it ought to be stricken from the literature. It simply means oversight; the right word is hypermetropia, or over-measure of sight.

Reference was made by the essayist to refracting opticians. My experience has been that nineteen times out of twenty, glasses prescribed by opticians are incorrect, unless the case happens to be one of presbyopia.

The essayist called attention to the fact that, in the case reported by him, atropin seems to have been the cause of glaucoma. I wish to say in regard to that, that every mydriatic known, even the mildest, has been supposed to set up glaucoma, even cocain, which is only slightly mydriatic.

Dr. J. W. Sherer, of Kansas City, Mo.—The points made by Dr. Ball are those that I have made mentally myself. The discovery of an excess of albuminous

or organic elements in the aqueous humor of glaucomatous eyes by Troncoso, of Mexico, is one of the best contributions of advanced thought on this subject. He has shown by a series of very careful chemical analyses that in the aqueous humor of glaucomatous eyes there is an excess of these elements. It is possible that it is true that in some cases of glaucoma there is obstruction of Schlemm's canal, but I do not think it is mentioned in the literature of the subject. The iris, in some cases, is pushed forward and occludes the space of Fontana and the filtration angle, thus precipitating glaucoma, but I do not think that Schlemm's canal is closed.

DR. TIFFANY (closing the discussion)—Dr. Ball takes exception to my paper. In the first place he says that the picture thrown on the screen was not a perfect picture of the appearance of the normal fundus. I do not pretend to say that it was. However, it did represent fairly well the normal appearance of the fundus of the eye. I would like to ask if Dr. Ball ever saw a perfect picture of the fundus of the eye in any book ever published.

DR. BALL.—I have a collection of pictures in my desk at home that I wish I had here.

DR. TIFFANY.—One cannot make a perfect picture to represent the normal fundus, as there are no two just alike.

With reference to the pulsation of the arteries, we do have pulsation of these arteries in some cases aside from glaucomatous eyes, but not with cupped disc. That is what I said, when you have cupped disc with pulsation at the margin of the disc that means glaucoma. You do not have it in any other disease.

He objects to the term optician. Opticians today are good, reliable men; they are capable of making examinations, and of determining whether an eye is hyperopic or not. I claim that the word hyperopic is just as scientific as the word hypermetropic, and it is used by all authorities on the subject of ophthalmology. The opticians are able to determine whether a person is hyperopic, mopic or presbyopic. Take some of the wholesale opticians of Kansas City or of Chicago, and they will tell you that the prescriptions they get from opticians are just as reliable, and in some cases more satisfactory than those emanating from some would-be occulists.

Again, Dr. Ball says that all mydriatics produce glaucoma, that even cocain will do it. I don't believe it. Sulphate atropia may occasionally, but very rarely. I use it right along in all cases, young and old, and if this case I

report today is one, it is the only one I have ever seen, out of some fifteen or sixteen thousand patients I have treated. Patients may have a halo about the light from mucous upon the cornea, but they do not have a halo of prismatic color; that comes from the light passing through the periphery of the lens when the pupil is widely dilated, the lens with its greater curvature acting as a prism.

XLII.—TREATMENT OF TYPHOID FEVER WITH CASTOR OIL.

BY C. C. BASS,

COLUMBIA, MISS.

It is proposed in this paper to call the attention of the Association to a treatment for typhoid fever which is at once old and new. The treatment is old in that castor oil has been administered for many years to relieve certain conditions as they arise in the course of the disease, it being often used to relieve tympanites, constipation and accumulation of undigested and hurtful food. Perhaps there are few physicians present who have not used castor oil at some time in the treatment of typhoid fever. It is the equivalent of the established elimitative treatment, but it is a better choice of drugs. It is new in that castor oil has never been administered as an exclusive, or nearly exclusive, treatment. The quite considerable inquiry which I have made has failed to find the treatment suggested in this light, except in an article of my own published in the *Mississippi Medical Record,* April, 1902.

This paper will present briefly—first, the theory; second, the method; and third, the result of the treatment.

1. *The Theory.*—Typhoid fever is an acute, contagious, self-limited disease characterized by inflammation, necrosis and ulceration of Peyer's patches and the solitary glands of the small and large intestines. The cases are generally divided into three varieties—the abortive, the mild, and the severe forms. In the abortive forms there is no necrosis and

no Peyer's patches. In this form the temperature reaches normal in the second week. This form seldom occurs in the section of the country where I practice. In the mild type, the temperature reaches normal in the third week, with slight elevations generally extending in the fourth week. The bowel lesions may be extensive, but healing is prompt. In the severe form the temperature ranges high. It may reach normal in the fourth week, but may not do so for a number of weeks longer. In the second or third week, the patient passes into a low adynamic condition characterized by dry tongue, sordes, delirium and muscular disturbances. It is also claimed that severe cases are those in which the absorption of toxins from the alimentary canal is extensive, and the elimination therefrom is defective. In the abortive cases there is seldom tympanites, in the mild ones very little; in the severe ones this is a prominent symptom. The more tympanites, the severer the case, and vice versa. Meteorism arises from two principal causes—first, increased fermentation, which takes place in the intestinal contents; and second, paralysis of the muscular coat resulting from toxemia. If the gases in the tympanitic are not themselves toxic, they, at least, increase the tension in the bowel and increase the absorption of the toxins and the germs that do exist in the canal. It is a firm conviction with me, that the serious nervous and muscular symptoms are, to a very great extent, if not altogether, due to the absorption from the intestinal canal of toxins. The results of the castor oil treatment prove this clearly enough, and, it seems to me, does it conclusively. Take any case of uncomplicated typhoid fever where the temperature ranges above 103 degrees F., and give a dose of castor oil every twelve hours, giving no other medicine at all, and the temperature will invariably be reduced in three days, and will generally be below 102 degrees F., and always below 103 degrees F. Any case with mild delirium will subside in the same length of time. The effects of the oil is confined to the bowel. It accomplishes what it does effect by eliminating from the bowel germs and toxins which would otherwise be absorbed. If sweeping germs and toxins out of the bowels,

thereby preventing their absorption, diminishes these symptoms, then surely the absorption of these poisons must be the thing that causes them or aggravates them. The administration of antiseptics, such as have no effect on the nervous system, will generally accomplish the same thing. This is again evidence that the cause of the severe symptoms, or the cause of their severity, is the taking up of something from the alimentary canal. Therefore the theory is deduced that, the more of these gases, toxins and germs that are eliminated from the bowel, the milder will be the case. The thing, then, if this much of the theory is correct, is a drug which will eliminate these poisons from the bowel, and, at the same time, has no effect upon the general system, and will not spend the patient's strength. Castor oil is the medicine wanted. It goes through the bowel practically as a bolus, or en masse, and cleanses them more thoroughly than any other purgative, and it does not draw upon the system or any organ of its purgative property, but acts of itself, and is not absorbed to overload the already overburdened blood with abnormal substances. I feel myself justified amply in saying, after repeated and careful tests, that castor oil does not weaken or injure the patient, and that no other purgative known to me or used by me acts in the same way. In typhoid fever, digestion is very imperfect, and fermentation is excessive. We have in the alimentary canal, therefore, at all times, more or less fermenting and undigested food, which, of course, makes a bad application to the inflamed, necrosed, or ulcerated mucous membrane. Move this off often enough to prevent any accumulation of it, and protect the membrane with oil, and the inflamed spots will not be likely to pass to necrosis, and ulcers will heal more rapidly. The quantity of this fermenting and undigested food will thereby be lessened, and the case thus held to as mild a course as possible. If the ulcers are slow to heal, and the case runs a long course, the patient is not overburdened with toxins to exhaust him before they do heal and the fever subsides. Abortive cases will be kept abortive, mild cases made milder, and severe cases will be converted into mild ones.

2. *The Method.*—Taking tympanites as my guide, my object was to keep the bowels as free as may be of germs, toxins and fermentation. When I first began the use of the treatment, I gave one dose of castor oil every twenty-four hours. I found that, after giving a dose, tympanites was partially or wholly relieved, but that it usually began to return before time for the next dose. I also found that the typical typhoid odor of the stool, while perhaps it was partially relieved, was never altogether. I then began to give a dose every twelve hours, and found that in from one to three days these conditions were entirely removed, the stool was rid of the typhoid odor, and was as odorless as that of the healthy man. The presence or absence of the typical odor of the stool became at once another valuable guide in the treatment. These two results—first, the bowels free from tympanites; and second, a stool free from the odor, indicating a satisfactory condition of the canal, can be had by administering a dose of castor oil every twelve hours, but it cannot always be had by less than that.

A dose of castor oil is an indefinite quantity in the treatment of typhoid fever. It varies in different cases, and in different stages and conditions in the same case. It may very from one to eight drachms. Enough to act in three to five hours should be given, but not so much as to act more than twice. If the patient is seen in the first week, when constipation usually exists, the dose will be from two to four drams, but if in the second or third week, when diarrhoea is the rule, one to two drams will be the proper dose. After one or two doses have been given, it can be easily regulated. During the second and into the third week, the dose is about the same, but increases considerably during the last week in the bed. In abortive cases the dose is usually larger all through the course of the disease. The taste is very well disguised by giving it in a warm cup with a little boiled sweet milk.

3. *Results.*—The result of the treatment is about as follows: The temperature ranges lower; the tympanites and delirium do not occur, and if they are present, they soon subside; diarrhoea and dysentery are prevented or checked if

they already exist; the disease runs a milder course, and the patient does not lose flesh and strength so fast as they generally do under any other treatment. The last named result is its greatest advantage over any antiseptic treatment. The explanation is, that any antiseptic that is effective enough to prevent or materially retard fermentation and germ life will also prevent or generally retard digestion. Castor oil does not do this.

Up to the present time. I have treated thirty-two cases of typhoid fever with castor oil, and, except in a very few of these cases, in which I gave some other medicine to meet some special symptom, I gave nothing else. In order to be brief, I will report them collectively. Thirteen cases were treated with one dose every twenty-four hours, and nineteen cases with one dose every twelve hours.

Three of the thirteen cases which were treated with a dose every twenty-four hours had a temperature above 103 degrees F., delirium and tympanites when the treatment was begun. These symptoms subsided in from three to five days. The temperature came down below 102½ degrees F., in from two to five days; after that they ran the same mild course that the other ten did. With the exception of one case for one day, and of the three cases in the beginning of the treatment, as just mentioned, the entire thirteen cases had a temperature during their entire course ranging below 102½ degrees F. Except as mentioned, of the three cases, delirium nor tympanites never occurred. Their temperature reached normal in from fifteen to twenty-six days, and there did not occur a single complication. Of these thirteen cases, four had diarrhoea and one had dysentery when the treatment was begun. In each instance, these symptoms were entirely absent within four days. Afterwards they continued as the other cases, having one or two actions after each dose of oil.

Of the nineteen cases treated with a dose every twelve hours, there were six cases with delirium, tympanites and a temperature above 103 degrees F. when the treatment was begun. In all of them, these symptoms subsided within three days, the temperature coming below 102 degrees F. There

were three other cases in which tympanites was prominent, in which it also subsided. After the third day of the treatment, excepting only in four instances, the temperature in the nineteen cases ranged below 102 degrees F. throughout the entire course. It is to be understood that of the fourteen instances referred to, maybe one, maybe two, maybe three, would occur in a single case. The temperature reached normal in from twelve to twenty-one days from the beginning to the attack. In calculating the duration of the disease. I have not taken the date of taking the bed as the first day of the illness, as is sometimes done, but, in each case inquired carefully as to the first day of the malaise headache, etc., even when there was no knowledge of the fever, and calculated from that date. One of the nineteen cases should have special mention. After a mild course, the temperature reached normal on the nineteenth day of the illness, and on the twentieth day began to rise again, and ran another course of twenty-three days, in which the temperature went above 102 degrees F. several different times. Free hemorrhages occurred on the thirty-first day of the illness, and tympanitis followed administration of opium and withdrawal of the oil. Tympanites promptly subsided when the oil treatment was resumed. In this case the treatment seemed to fail, the duration of the disease and hemorrhages considered. Six of these cases had diarrhoea when the treatment was begun, which invariably subsided in from one to three days. To sum up the nineteen cases, and leaving out the one specially mentioned, after the third day the temperature ranged below 102 degrees F., tympanites and delirium were absent and the temperature reached normal in from twelve to twenty-one days from the beginning of the attack, making them all abortive or mild cases.

It is true this is too small a number of cases to base positive conclusions on, but it is large enough to commend the treatment to us as worthy of further investigation.

DISCUSSION.

DR. A. HERRING, OF HIGHLAND STATION, KANSAS.—Mr. President: This paper is a good one, but we have to learn and unlearn many things in medicine. While the treatment advocated by the essayist may be suitable for some years,

we will find other years during which typhoid fever prevails when this treatment would not be suitable.

In the treatment of typhoid fever we have to use antiseptics, and a good one, which is not original with me, is ten drops of carbolic acid and sixteen drops of tincture of iodine, in four ounces of water, given every four hours, and about five grains of subnitrate of bismuth. Then, in connection with that, use your castor oil. Castor oil itself is head and shoulders above everything else when we want to move the bowels, and these patients do better when their bowels are kept open.

DR. WM. BRITT BURNS, OF MEMPHIS, TENN.—I rise to thank Dr. Bass for his paper. I think this is the first time he has attended a meeting of this Association. I do not want to discuss the question of castor oil in the treatment of typhoid fever. The question the essayist brings up shows plainly, as we all know, that typhoid fever is practically a self-limited disease, and will run its course, and that elimination is one of the modes of treatment. While I should like to have the Doctor's paper receive a full discussion, I hope the whole question of the therapy of typhoid fever will not be gone into, inasmuch as this was done at yesterday's session of the Medical Section.

DR. THOMAS HUNT STUCKY, OF LOUSIVILLE, KY.—I am very much interested in this paper. In the last twenty-one years of practice I have encountered a great many specifics for the treatment of typhoid fever. I believe the principle, *per se,* in the management of this condition is to control the process of absorption or defective oxidation. When we take into consideration the pathological changes which are going on in the Peyerian patches and solitary glands and follow out the course of the disease, recognizing that the mere crippling of the digestive apparatus is going to interfere with the hepatic elimination we are going to have, and that tendency to general infiltration of the tissues, with the increased work placed upon the heart and the nervous system, we are bound to recognize the fact that, in addition to the destructive process produced by the disease itself, we are having an autointoxication, a constant re-infection, going on. Then if this be true, it is just as true in internal medicine as it is in surgery, that the principle to apply is that of elimination, is that of unloading, is that of lessening the work placed on the digestive apparatus. Evidently, the essayist does not believe in the abortive process of typhoid fever from the history of his cases. I have no objection to castor oil, except the unpleas-

ant reminiscences of youth, when it took everybody to hold me to give me a dose of it, which is a serious objection. But, I believe, gentlemen, that we have agents at our command, agents in the pharmacopeia, and in advanced materia medica far superior in their action, more definite in their action, acting not only as cholagogues, but which arrest the fermentation processes when the patient is so debilitated and so weak that the mere purgation is unwarranted. I concede the fact that, as a principle, the essayist is on the right track; but I believe to go before the profession of the country with the statement that twenty-three, thirty-three, or a hundred and thirty-three cases formed a basis for the treatment of this disease is a dangerous precedent. I say this in all kindness, and in the admiration of the confidence and the honesty of purpose evinced in the paper.

Summarizing, then, the treatment of typhoid fever, I believe the whole condition and every patient is a law unto himself or herself, as the case may be, and it may be summed up in a few words, elimination and support, and there is nothing else to do. There is no set treatment, whether it be the Woodbridge or the Brand treatment, that we can follow. You recognize, and I recognize, the destructive influence which high temperature has. Is it not far safer to try sponging, whether it be hot or cold, for the reduction of temperature, than to take chances and upset the stomach by the administration of castor oil? If it had been Castoria, children would cry for it. (Laughter.) The Doctor does not even modify the taste of it so as to make it better.

Dr. T. D. Crothers, of Hartford, Conn.—I am very much pleased that this old subject has been brought up again. The question of castor oil in the treatment of typhoid fever was discussed, if I remember rightly, very thoroughly in 1865. An elaborate report of some two or three hundred cases treated with it alone was presented, and the mortality was so great that the treatment never became popular. Some practitioners made a comparative estimate of the value of castor oil and sweet oil in these cases, but the mortality was greater from castor oil than from sweet oil. After this, glycerine was tried, and now this subject has come up again.

I think the essayist, if he will take the pains to look up the subject, will find a large literature regarding castor oil in the treatment of typhoid fever. As Dr. Stucky has said, our views of this disease have changed materially. We do not keep the bowels covered up with oil to stop ulceration,

as we did formerly. We should use as few drugs as possible, but give these patients water freely internally and externally, which is a safe way to treat typhoid fever.

DR. JOHN PUNTON, OF KANSAS CITY, MO.—This question was ably discussed at a previous meeting of the Medical Section, and I believe at that time the remarks that were made in reference to the treatment of typhoid fever, led physicians to feel that there was really no treatment for typhoid fever, as yet, particularly one that was a specific. Acetozone, which was mentioned in that discussion, I believe, is an excellent intestinal germicide and antiseptic. Most excellent results were reported from its use. This subject does not come within the domain of my practice, however, and I have only recently been interested in this drug. A few months ago I had a serious attack of the disease myself, and I want to say, that if I were a patient today, after hearing the discussions in reference to the subject, I should want castor oil eliminated from the treatment, for the reason that it is altogether too depleting and too exhausting.

The essayist, it seems to me, is lame in his paper in reference to supportive treatment. If we were to follow out the treatment as recommended by him, many of the patients would die from exhaustion, and would not have a chance to recover. It would seem the less medicine we use in typhoid fever, the better.

DR. BASS (closing the discussion.)—I do not wish to be understood as saying that castor oil is an absolute specific for typhoid fever. I may say, however, that I had the opportunity, while I was carrying out this treatment, of observing cases that weer treated by other physiscians by other methods, and they did not get as good results as I did. These cases were observed at the same time of the year and in the same epidemic.

DR. BURNS.—What was the dose given?

DR. BASS.—The dose is an indefinite quantity, but it ranges from one to eight drachms. The dose has to be regulated to suit the individual case.

As to the remarks of Dr. Stucky, with reference to not purging his patients, and saying that this cannot be done when they reach a certain critical point, I have been unable to find a patient that has reached that point under this treatment.

I may say, in reply to the remarks of Dr. Punton, that there is no depletion from the administration of castor oil,

no effect, so far as the strength of the patient goes, that I have been able to observe in these thirty-two cases.

One of the speakers (Dr. Crothers), referred to the literature in reference to typhoid fever away back in 1865. I am familiar with that literature, and, if I am not mistaken, castor oil was administered for the purpose of relieving tympanites, accumulations of foods, etc., but not as an exclusive treatment all the way through.

XLIII.—THREE MONTHS' OFFICE EXPERIENCE IN THE TREATMENT OF CHRONIC DYSENTERY.

BY JNO. L. JELKS, M. D.,

MEMPHIS, TENN.

Dysentery was one of the best known and perhaps best understood diseases of antiquity, the gravity of the disease also has always been such and is today that this subject is rendered too broad to confine one's remarks to a brief thesis merely, but there are a few facts and ideas to which especially I desire to call attention. As a brief retrospect of the disease, its severity, and treatment should not be amiss here I quote Dr. W. W. Johnson, who in the Reference Hand Book of Medical Sciences, thus most ably recites: "It was well known before the time of Hippocrates, 430 B. C., but this writer was the first to give an accurate description of its symptoms."

He clearly differentiates it from diarrhea, as the following extracts from his works show: "But when the body being heated, acrid matters are discharged, the intestine is excoriated, ulcerated and the stools are bloody: this is dysentery, a grave and dangerous disease, etc."

"From the time of Hippocrates to that of Celsus, 25 B. C. —45 A. D., the contention of schools and theorists did but little to advance medical knowledge, but the writings of the 'Medical Cicero,' as Celsus has been called, may be said to epitomize the learning and practice of his predecessors, and that the chief features of dysentery were then understood.

Aretaeus (50 A.D.) recognized without doubt by actual observation that the ulcer was the peculiar and dangerous lesion of the intestine dysentery."

A century later Galen (164 A. D.) said that physicians of his time limited the term dysentery to cases of intestinal ulceration.

"Alexander, of Trallus (575 A. D.) distinguished dysentery in which various tumors are discharged by stool from the graver variety due to ulceration of the bowels, in which shreds of the intestines are mixed with the discharges."

Other writers of antiquity, as Paulus Aegineta (660 A. D.), who made tenesmus and dysentery separate affections; Fornelius and Fabricius Hildanus gave more or less accurate definitions of the disease and of its characteristic phenomena.

Thus we are led down through the ages to the present time, and, in passing, mention is made of the first post-mortem examination of subjects, who were known to have died of this affection, as referred to by Antonio Benivieni in 1506; also the writings of Hallerius 1565; Schenckius, 1584; Sennertus, 1626; Sydeham, 1672; Bonatus, 1679; and Morgagni, 1762; that following these came a host of writers who added much to the clinical knowledge and theraputics of dysentery by a large experience in epidemics in Europe, India and Africa and in the armies and fleets, and that among those of whom special mention should be made are: Digner, 1743; Pringle, 1752; Vogel and Mayer, 1765; Zimmermann, 1765; Stoll, 1780; Rollo, 1786; Hunter, 1796; Disgenettes, 1802; Fournier and Viday, 1814; O'Brien, 1822; Annesley, 1828; Cruveilher and Virchow, 1842; Cambay, 1847; Cattleloup, 1851; Dutroulau, 1861; Heubner, 1871; Woodward, 1879; Favrer, 1881; Kartulis (In Egypt), 1885; Councilman and LaFleur, 1892; Ogata and Shiga, 1897, in Japan; Flexner, 1890; Strong and Musgrave, 1900, in the Philippine Islands.

Thus I have trespassed upon your time to set forth more clearly the magnitude of this subject upon which so many volumes have been written by abler writers from the days of Hippocrates to the present; however, my excuse for selecting

this subject is made in the recitation of facts relative to the treatment of this disease, for my belief is that if during the war between the States and the Hispano-American war, and especially during the various scourges in this and foreign countries, different ideas as to treatment had been conceived and practiced, not so many deaths would have been recorded. In thus confining my remarks to the treatment, I should not engross the thoughts of my hearers in the multitudinous etiological factors and the gross and microscopic pathology of the disease, though to properly treat such cases, one must have a correct idea as to these from the beginning and during the stages of the affection. Whether the disease be due to the amoeba dysenteric, or to the bacillus dysenteria, or of any other microbic origin; granting, as all authors do, that each is due to infection by some specific micro-organism, this concession is the basis of all treatment which tends to shorten the duration and lessen the severity of an attack.

Whether the disease be classed among those of sporadic dysentery, such as we encounter especially during the summer and autumn months in the temperate and tropical climates, or occurs as epidemics and of the gravest types, such as that referred to by Shiga in Japan in 1897, when 22,300 deaths, 24 per cent., occurred out of 89,400 cases, the same general idea must obtain as to treatment. However, of course, vast differences as to pathology in the different forms and stages of the disease would require a like classification of treatment, but with the same ultimate object in view, viz: the destruction of the micro-organism, cleanliness, rest and restoration of the diseased tissue. Primarily, it is necessary for me first to briefly consider the subject of acute dysentery by way of introducing my subject proper—chronic dysentery.

In the beginning of an attack of endemic dysentery, such as we see especially during the summer and autumn, very little pathology is noticeable to one making a microscopical examination of the affected intestine. The mucous membrane is as yet intact and is devoid of those grave pathological appearances noticeable in other varieties or in the same case later in the attack. For as yet the serum simply pours out of

the swollen mucous membrane as water is squeezed from a sponge, and the membrane seems studded with minute hemorrhagic puncta, and notwithstanding the great exosmosis of this sero-sanguinous fluid, the membrane remains congested and thickened, and if this great engorgement is not relieved, destruction first of its epithelial covering and even of the entire thickness of the mucosa follows, and here the homeopathic idea, while erroneous, in fact would appear correct as to the result, for every physician recognizes the condition and immediately administers drugs which increase the exosmosis, his favorite prescription being magnesium sulphate, with the very apparent and common result of aiding the vessels of the intestines to empty themselves and of depleting the mucosa. Here, and perhaps without such purpose in view, the micro-organisms which bear a casual relationship to the disease are washed away by the free saline catharsis. If the dysentery has been preceded by a diarrhea, and the colon is thought to have been emptied, small doses of castor oil may be preferred to salines. Entering further into the recent ideas of the treatment in the early stages is the administration also of such antiseptics as mercury, salol, guaiacol, zinc, sulpho-carbolate and a host of other drugs which are of undoubted benefit in selected cases. It has been the custom among doctors for many years to administer enemata of starch water, infusion of flax seed or slippery elm, added to which some give opium in some form. But the local treatment of these or those of graver forms of the disease has scarcely extended beyond this. The erroneous idea has been that the disease, though affecting the larger bowel, and especially the rectum and sigmoid flexure of the colon, was beyond any possible local application, further than perhaps the use of the Wales metal bougie, which, in the majority of cases, would positively be dangerous, while the bowel is in this highly inflamed state.

I have recently suggested to one of my abler confreres the value of local treatment in connection with administration of drugs by the mouth, when his ready response was that he could not get at the seat of the trouble. Those who have

used the sigmoidoscope and long rubber tubes know as I do that my friend, in this statement, is sadly mistaken, and here the need is made apparent of the education of the profession as to the possibilities of the surgeon's efforts when armed, as he must be, with the proper and essential instruments, and is expert in their useage.

Not so much need of these instruments is apparent here however, as in the sub-acute or chronic form and in the graver form of the disease, and here I make this distinction because of my belief that in those grave forms of the disease, when in a few hours the patient would succumb, no great time should be lost in dealing with the disease as necessity may require. And in setting forth my idea as to the treatment of dysentery it must be understood, first, that no iron-clad or routine rules of treatment can be laid down. To the contrary, and notwithstanding the merit of any treatment, or procedure advised by anyone, the same may be in some instances wisely thought impracticable, though scientific. I have never been able to treat children satisfactorily by instrumentation. Though my idea is not in this paper to recite fully the medical treatment, I should mention a few facts and ideas which can not be amiss.

The first of these is the surrounding sanitary conditions. For it is a well and generally conceded fact that heat and moisture and such environments as are unsanitary are predisposing causes of our endemic or sporadic dysentery. Therefore, particular care should be exercised in the selection and care of the bed chamber, as also the house and surrounding premises of one stricken with the disease, and directions given relative to the sanitation of these, and especial care taken in the disposition of the excreta of the patients.

All articles of diet should be selected with the greatest care and thoroughly cooked, if in the least liable to become contaminated with micro-organisms. Milk, which in these cases is an article of diet almost indispensable, may be unfit for such use unless boiled. Soft boiled eggs, and especially the whites of eggs given raw or beaten into froth and sprinkled over with lemon juice, is an article of diet which

than all others is the most serviceable and acceptable to the irritable stomach and bowel, and for the reason in particular that it is digested in the stomach and leaves little residue. From six to eight eggs will be taken in this way during twenty-four hours without loathing.

In the early stages of the disease, there is usually noted extreme depression and the portal circulation is sluggish. The portal engorgement is first relieved, as also the intestinal tract is thoroughly freed of any indigestible and irritating ingesta, by a large dose of salines, among which I prefer magnesium sulphate, to each dose of which may be added dilute sulphuric acid. For extreme depression and sluggish circulation, strychnine is indicated. Following this may be given such intestinal antiseptics as zinc sulpho-carbolate and calomel, each one-twelfth to one-sixth grain every one or two hours, which latter serves a two-fold purpose of acting as a local antiseptic (however, in such minute doses it can scarcely be classed as such), and later, by its having stimulated the liver cells, causes a free flow of bile and a freer circulation in the liver, which should not be lost sight of as the normal antiseptic to the intestinal tract. Such remedies as salol, guaiacol, zinc sulpho-carbolate and turpentine have undoubted antiseptic properties throughout the intestinal tract. Either poultices or the ice bag may advantageously be applied over the abdomen, and, if need be, additional quiet of the patient and relief of the tormina obtained by hypodermic administration of minute doses of morphine, grains one-sixteenth to one-eighth to one-fourth. The bowels should be thoroughly cleansed by a high enema every six to twelve hours, and these enemata should be rendered antiseptic with either boracic acid or formalin, when thereafter such soothing applications as egg albumen, slippery elm, flaxseed infusion, or starch water, may be used, and by reason of the fact that some of the antiseptic solution remains in the bowel, these soothing applications are not, as otherwise, a rich nidus for the propagation of micro-organisms.

If the hemorrhage from the bowel is quite profuse, a very warm enema through the double tube method should be given,

and to this solution may be added tannin in any form. Strychnia is especially indicated in these, as may be also ergot or bismuth sub-gallate. The introduction of the tube in some may be facilitated by making it very cold, while in other cases the warmth is less irritating to the inflamed viscus. However applied, water is the essential application to secure cleanliness, for how can a membrane so delicate as that which lines the intestines be expected to get well when constantly bathed with the irritating bowel contents and furnishing, as the intestinal mucosa does in such an inflamed state, a rich nidus for the propagation and dissemination into its deeper tissues and the blood deadly micro-organisms and their toxins is a question which some cases will answer by recovery while failing to explain.

When the case presents those graver manifestations, the sigmoidoscope should be used, and though the same would appear a task, its introduction is accomplished without great pain or trouble. If the patient is very weak, support by two assistants should be given so that the knee-chest position can be obtained for the few minutes required; and, before the patient is made to assume this position, every instrument or article which may be needed should be in easy reach of operator and an assistant to hand them to him as required.

The well annointed sigmoidoscope is then introduced beyond the levator muscle, and held steadily, when the fenestra may be removed, and a rubber tube attached to a piston syringe, introduced through the sigmoidoscope, and all the fluid drawn away in front of the onward passing instrument. The bowels should be cleansed as the instrument enters with hot boracic acid and formalin solution, while, if there is much excoriation or ulceration, a ten to thirty to sixty grain per ounce solution of silver nitrate may be applied to the bleeding and eroded surfaces with a cotton probang, or the same may be sprayed with a five to thirty grains per ounce solution with an atomizer. The formalin boracic solution insures the destruction of all micro-organisms with which it comes in contact, though of the former drug only one to one, two or three-thousand solution is used.

When the instrument is made to efface the intestinal curves while entering the sigmoid, more pain is experienced than from any other part of the surgeon's duty, and the patient is apt to strain considerably if not forewarned that he must not do so. The bowel thus entered and treated as demanded or indicated as far as the sigmoidoscope can enter, one or two tubes of soft rubber may be passed on further into the colon and a milder silver solution (ten to sixty grains to the quart) used, or these tubes may remain in situ while the sigmoidoscope is removed and the patient allowed to rest on the bed, when at a later time the hot antiseptic solution may be used and drained away. Double normal saline solutions are of great value, especially when the patient has been greatly depleted and is very weak. It acts also as an antiseptic in the intestines and may be combined with boracic acid.

If, as I have found beneficial in some cases of a subacute or chronic character, it is desired to use such as boracic acid, iodoform, or aristol in the dry form, the same may be insufflated through the sigmoidoscope onto the bowel surfaces so as to cover entirely the mucous membrane. I have found as the best instrument for insufflating dry dressings into the sigmoid and rectum a common powder insufflator with a long beak such as is used by the housemaids to destroy insects about the house and furniture. This dry dressing is very grateful to some patients, and though, after the preceding treatment, some are caused to suffer some pain and tormina, the dry powder applied over the surfaces soothes and protects those surfaces.

If after some hours from the time of treatment the patient is unrelieved of the distressing tormina, a hot or cold slippery elm, egg albumen, or flaxseed meal infusion may be thrown into the bowel, and either a hot poultice or ice bag placed over the abdomen. If the acute condition has entirely subsided, these instrumentations will, of course, be less painful and difficult, but when necessity requires and when a fatal issue is otherwise probable, must not be neglected, though anesthesia is required to render possible their application. The condition is entirely a local one to the

proctologist, and the difficulties surmountable, with, I dare say, a markedly better chance for recovery. In using the hot solutions previously advised, I think it better to use the double-tube method, as by this means you avoid the painful, or perhaps dangerous, over-distention of the inflamed bowel. In the chronic state, I have found most beneficial effect from iodoform and ichthyol made into suppositories and passed through sigmoidoscope into the sigmoid. This is especially indicated in tubercular conditions, but in any form of protosigmoidits or colitis, all toxic drugs must be used with caution. I have caused iodoform poison rash in several cases in this way.

The sub-acute and chronic forms of the disease I prefer to treat in my office every third or fourth day, as this, being fitted with all of the latest devices and having such remedies as mentioned at hand, I can more satisfactorily treat them. I have, during the past three months, treated seventeen cases in my office, ten of whom have been cured. From my notes of these cases I have made the following deductions, which should prove of some value:

Eight were evidently previous subjects of obstipation; two were the result of syphilis; one was the result of tuberculosis; one had previously suffered for a long time with hemorrhoids and proctitis, also a vicarious menstruation from the rectum, which latter condition I have never observed in but the one case; six had previously suffered with chronic stomach trouble, gastric distention and gastralgia, and required stomach irrigations and belting; three supervened upon attacks of acute dysentery without any other apparent etiologic factor.

In order to characterize each group and the treatment administered, I will report very briefly one of each series:

Obstipation.—Mr. J., of Knoxville, Tennessee, had suffered for three years with chronic dysentery, which was contracted during service in the Hispano-American War. Had traveled to various sections of the country in quest of health. Had lost forty pounds in weight; came to me from Florida. Was having from fifteen to twenty discharges from bowel during twenty-four hours. Nothing which he

would eat seemed to agree with him. There was not great tormina attending bowel movement. Prior to the dysenteric condition, he had for years been constipated.

Examination.—Rectum was inflammed, and above the plicæ themselves were eroded in spots, and from these eroded areas was oozing a sero-sanguinous fluid; covering the entire mucosa was a blood-stained mucus mixed with pus. After gently wiping away this bloody mucus and pus, the inflamed membrane at first seemed studded with minute puncta, from each of which oozed blood.

The two lower plicæ were much thickened and could not be effaced. These structures stood out so prominently and fibrosis was so well marked that the finger introduced into bowel without dilation could easily detect them as hard semi-fibrinous bands crossing the bowel lumen, one just above the other and attached to opposite sides of the bowel wall.

Hot formalin solution was used through sigmoidoscope to cleanse the entire mucosa of rectum and sigmoid, and after getting this away and drying the mucosa, a suppository of ichthyol, aristol, morphia and cocoa butter was introduced on long stick through sigmoidoscope and deposited beyond end of tube and passed out of sight into colon. Then silver nitrate, thirty to sixty grains to ounce, was applied to all ulcerated or eroded spots, after which the entire bowel mucosa was covered with aristol, bismuth, formic iodide and boracic acid by insufflation.

This treatment was repeated every third day, and in the interim every night he had the bowel washed thoroughly with either saline solution or boracic solution, and one hour thereafter, when the bowel had passed off all of the irrigating fluid, he had deposited through smallest size soft rubber rectal tube attached to piston syringe, bismuth subnitrate, drachm one; olive oil, ounce one.

As soon as the more violent inflammation had subsided sufficiently, valvotomy was performed by the clip method; treatment by enemata and rigid diet continued until clips had come away, when the active treatment was resumed. He was dismissed in one month, entirely well, and I am reliably informed has regained all lost weight—having weighed at beginning of treatment 130 pounds, his present weight being 170 pounds.

He was kept under the strict and watchful care of his uncle, Dr. John F. Cochran, while under my treatment, and in this way his strict regimen of diet was maintained.

Of the syphilitic cases, I have little to say. They are not well, and I have neither learned from medical literature or my own personal experience how to make them so. You seldom see this class of cases until involvement is so extensive as to preclude hopes of a perfect and permanent recovery.

The treatment previously outlined, combined with the internal administration of iodides and the oxytanate of mercury, or mercury rubs, has been the treatment prescribed.

The tubercular form of the disease, I believe, is amenable to the same treatment with the addition of iodoform rubbed into the bowel walls, either in form of emulsion or, much better, the iodoform vasogen rubbed into the coats of the bowel every third day until iodinism is well marked and maintained for some days. Ichthyol and formalin also are credited as highly as the iodoform for the one recovery in two cases treated, only one of which is included in this report. The other case would not submit to the dreadful taste and unpleasantness of iodinism, though when he left me, he no longer had dysentery, and his bowel moved only once or twice in twenty-four hours. The last time I heard from him he was in Hot Springs, Arkansas.

Among the six referred to as having associated stomach troubles, I scarcely know which could be the most interesting. They are all so, and if time permitted, I should report more fully each instead of one.

On June 6th, 1900, I was called to see Mr. R. and treated him through an acute attack of dysentery. He had suffered previous attacks. His bowels were quite sensitive and tender to weight. I attended him one week and dismissed him. He has had other attacks, for which I have not treated him, and I had lost sight of him until September 10th, present year, at which time he presented himself for examination and treatment. Said he had been treated by my friend, Dr. Krauss, for stomach indigestion and distention by irrigations and dieting. He said he had, however, just returned from Battle Creek Sanatorium, where the strict regimen of diet and enemata had benefited him only temporarily. Examination revealed a greatly distended colon, abdomen tympanitic and tender. Proctoscopy revealed the cause of his constant pain in abdomen, enor-

mously distended large bowel and intermittent dysentery. The two lower plicæ were greatly hypertrophied, and so close together as to almost be coarcted. Fibrous infiltration was extensive. The proctoscope could only with difficulty be made to pass these structures. As soon as practicable, valvotomy was performed, and he is greatly improved. Indeed, considered himself well yesterday, at which time his abdomen was noted to be flat. He had not suffered for a week with flatus or abdominal pain. Has gained in weight and strength, and is improving in spirits. I noted at this time, however, that the clip had not taken away a sufficient bite of the lower valve, and I immediately applied another, which will come away in eight days, and he will then be dismissed. I have kept the abdomen strapped with wide adhesive for two weeks, which, he says, gave much support and relief. In several cases of this nature I have been forced to irrigate the stomach, but in this one the previous treatment had been quite sufficient as far as the stomach was concerned.

Among the sixth divisions of cases is that of Dr. J., who was referred to me by Dr. Richmond McKinney, of Memphis, on October 3d, present year. He had suffered an attack of tropical dysentery in Central America, for which cause he abandoned his post, and went to New York, where he had his appendix removed. His dysentery, however, continued, and he had his bowel cauterized under anesthesia, and had submitted to much treatment, with no benefit.

I find in his case the typical proctosigmoiditis, and the three treatments given him have benefited him more than all that had previously been done for him. I do not doubt that his appendix was diseased, nor do I doubt the necessity of having it removed, as was done by one of the ablest men in America, but here is an important surmise and an interesting fact which I would have you note:

First, his appendicitis may have been the result of an extension of a sub-acute inflammation of his colon, and the great distention of that viscus incident to intestinal fermentation. Secondly, it is a fact as noted by me in some of these cases that pain is referred from the plicæ transversalis recti to the appendix, as in the case of Mr. R., previously referred to, considerable pain was experienced in the right iliac fossa about McBurney's point for some hours after the clips were applied.

DISCUSSION.

DR. WM. F. BARCLAY, of Pittsburg, Pa.—I wish to thank Dr. Jelks for this excellent paper. When I began to practice medicine in 1866, this form of disease was very prevalent. It was just after the close of the Civil War, and the number of cases of chronic dysentery referred to by the writer was perhaps greater than at any time in the United States. I know how difficult it is to manage these cases of chronic dysentery, and while the treatment of the essayist is most instructive, I wish to call attention to something that has seemed to me of more advantage in the treatment of these cases than anything I have tried. The silver preparations, more especially the oxalate of silver, were used, and depended upon entirely in the treatment of these chronic cases, with the application of a bandage or flannel about the abdomen, which afforded an equal temperature, and aided in the treatment of the dysentery.

A remedy I have used with great advantage is arsenite of copper. I believe it to be of more advantage in the treatment of cases of chronic dysentery than anything I have used. It should be given in frequent doses. At the same time, the sulphate of magnesia, which has been referred to, is no doubt of some value. But I do not recall a single case where I prescribed the arsenite of copper that it failed to be of great advantage and effect a cure.

DR. HALL.—In what doses?

DR. BARCLAY.—You are aware, Dr. Hall, that arsenite of copper is put up in tablet form. I generally add about two of these tablets, one one-hundredth grain each, to six ounces of water, and give one teaspoonful every two or three hours, according to the circumstances, and nothing has seemed to me to be of so much advantage in the treatment of these cases as that drug. I remember many cases that were prolonged for months and were even pronounced incurable, but since I have used arsenite of copper, I have had the pleasure of seeing my patients get well promptly.

I wish to call attention to this point, that sometimes there is a certain condition following these cases which may occur, perhaps, in the practice of Dr. Jelks. It has seemed to me that the ulcers have been conducive of constriction or narrowing of the bowel, and in those cases there has very often been, even when the diarrhea was cured, a condition that, under my care, seemed to be almost beyond anything that medicine could relieve.

DR. G. HOWARD THOMPSON, of St. Louis, Mo.—If I remember rightly, the essayist mentioned the use of the sulpho-carbolates and calomel as intestinal antiseptics, the dose being from one-twelfth to one-sixth of a grain. I have used the sulpho-carbolates in these doses, and have failed to see that they have made an impression whatever as antiseptics, or even exerted any inhibitory power over the growth of germs, and as far as acting on the mucous membrane is concerned by their stringency, I have failed to see that they did so effectively. I believe in the use of the sulpho-carbolates in this condition, but the dose should be about five grains, and where astringency is essential, I use pure sulpho-carbolate of zinc. Where its astringency is not so much desired, as in those cases where we get a septic condition, the triple sulpho-carbolates of zinc, sodium and magnesium, a grain and a half of each, is useful, and I give this about once every two hours. Calomel, of course, is an intestinal antiseptic. I do not believe in giving calomel in doses of less than five grains, especially to a patient lying on his back. Every case of calomel poisoning or mercurialization from calomel I have ever seen, excepting one, was produced with doses of calomel less than one grain, and always in cases of people lying on their backs. I have been called to treat cases of different sorts, as diphtheria, typhoid fever, etc., and have found them to be cases of calomel poisoning, the calomel having been administered in fractional-grain doses. I was called to treat a case of typhoid fever in consultation in a town in Illinois. Instead of a case of typhoid fever, I found a case of calomel poisoning. Again, I was called in consultation to treat a case of cirrhosis of the liver, the patient having been treated with calomel. I found no indication of cirrhosis of the liver, but a clear case of calomel poisoning, general salivation. Both of these cases occurred in the same town, and both were due to fractional doses of calomel. I believe good results can be obtained from calomel, but I don't believe in giving small doses to a patient who is lying on his back. I believe we should give a dose large enough that will pass through, and give it to him when standing up.

One of the best remedies I have used in the treatment of dysentery was mentioned by the physician (Dr. Barclay) who preceded me—the arsenite of copper. I have used it a great deal. It is only recently I have encountered cases of sub-acute and chronic diarrhea that did not yield quite readily to this treatment, but I use a combination containing

one one-hundredth of a grain of arsenite of copper, one one-hundredth of a grain of bichloride of mercury, and one one-hundredth of a grain of morphine sulphate. I do not believe in these small doses of morphine sulphate; the tablet comes prepared in that way; I do not dissolve one of these in a cup of water, four to six ounces, and give a teaspoonful; I give a tablet as often as every hour, and get good results. Mercury is a very good gastro-intestinal antiseptic; so is arsenite of copper. Arsenite of copper is also an astringent and the arsenic element is an alterative to the linings of the body—external as well as internal. The morphine is somewhat anodyne and checks excessive secretion and excessive peristalsis. The combination of the three ingredients is excellent clinically. I incline to the belief that the author of this paper has achieved his success more by his direct local treatment than by remedies administered by the mouth.

Dr. Silvio von Ruck, of Asheville, N. C.—The method of local treatment which the essayist employs in his dysenteric cases must appeal to one as rational in those cases in which the lesions present are situated either in the rectum or sigmoid flexure, within reach of the operator. But in cases of tuberculosis of the ileum, and this is the most frequently affected portion of the alimentary canal, local applications are, of course, out of the question, and we are compelled to depend upon suitable dietetic measures, combined with the administration of drugs internally. In the Winyah Sanitarium, with which the speaker is associated, intestinal tuberculosis is occasionally met with as a complication in pulmonary cases. In a number of such cases large doses of subnitrate of bismuth with iodomuth have been successful in controlling the watery, mucous and bloody discharges, and in rendering the stools more solid. In tuberculosis of the bowel, as well as of any other organ or tissue, it is important to keep in mind the pathology of the disease in choosing the method of treatment. When ulceration is present, the result of caseation, softening and destructive changes in tuberculous foci, the associated symptoms are to be ameliorated only by suitable medicinal and dietetic treatment.

While often such means seem effective, they do not cure the disease, for tuberculous infiltration always extends peripherally about ulcerated foci, and tends constantly to progress in surrounding portions of the mucous membrane. These infiltrations at first consist of tubercles made up of

active, living cells, and if something is not done to prevent, will eventually undergo the same degenerative and destructive alterations which previously took place in the ulcerated foci. The tuberculin preparations, properly administered, while they have no effect upon necrotic, caseous or fibrous tissues, can, and do, exert an influence over the more recent active tubercles, causing them, as may be seen with the eye in tuberculosis of visible mucous membranes, often to become resolved and disappear. In order, therefore, that the patient may not suffer relapse at some subsequent period, although the disease may be apparently arrested or latent for a time, it is essential that further ulceration be forestalled by the removal of the more recent tuberculous changes, and I would therefore strongly urge in these cases, as an adjuvant to other means, the employment of specific medication which, when properly carried out, is productive of much more permanent results.

Dr. Frank D. Smythe, of Memphis, Tennessee.—I feel very much indebted to Dr. Jelks for having had the pleasure of listening to his admirable paper. Living in the same city with Dr. Jelks, I have personal knowledge of his experience in the treatment of diseases of the rectum and of the alimentary tract. His work has been faithful and conscientious, and his results have been gratifying. I have had the pleasure on several occasions of witnessing some of his demonstrations of the use of the proctoscope, and his method of treating sigmoiditis, colitis, and inflammations of the lower bowel.

I rise, particularly, to report a case that I saw some months ago, in consultation with a physicion. The patient, a man, was taken with a violent pain in his right side; his family physician was summoned, who made a diagnosis of appendicitis, and suggested an immediate operation. I was called, and concurred in the diagnosis of appendicitis. The patient was transferred to the hospital, and operated upon within four hours after the initial symptoms. He was perfectly well the evening before. At eight o'clock the family physician was summoned, and he was operated upon at twelve. The appendix was about two and a half inches in length, with a short meso-appendix, somewhat enlarged, and markedly hyperemic. The caput coli and ileum were also engorged. The removal of the appendix was done promptly, the wound closed, and the patient put to bed.

Opening the appendix, we found an ulcer at least three-fourths the length of the organ; this had ulcerated and de-

stroyed all of the tissues, with the exception of the outer coat of the appendix. Within ten days the patient was conveyed to his home, contrary to my wishes, but so far as the wound was concerned, primary union had occurred, and there was really no necessity for the surgeon to see him. His family physician dictated the treatment after he left the hosptal. The third day, after his return home, I was summoned in consultation a second time, and found the man almost exsanguinated from the profuse hemorrhage which had taken place. A general practitioner was called in consultation, who concurred in the diagnosis of dysentery, and the two physicians (general practitioners) with myself conducted the case for a period of over five or six weeks. He recovered, but the dysentery came near killing him, after he had undergone a successful operation for appendicitis.

From the reports of Dr. Jelks's cases, I should say that this patient had an ulcerative colitis and ileitis at the time of the operation, although he was not sick, because the day before he was attending to his business, and we had no reason to suspect that he had an extensive bowel lesion. Finding the appendix diseased, we deemed it the best thing to remove it as soon as possible, as it is not a good idea to spend too much time in exploring organs without having some evidence of their being diseased before the incision is made.

Dr. Jelks (closing the discussion).—I have very little to say other than to express my appreciation for the free discussion that has followed the reading of my paper.

I have not had any experience with arsenite of copper. As to minute doses of mercury, I do not expect to get any particular antiseptic effect from the mercury itself, as I remarked, but mercury in large doses, you will please be reminded, acts as a purgative. Small doses, I think, are rather stimulating to the liver, and it is the free stimulation of the liver cells that I expect to get benefit from, in that we get an outflow of bile. We relieve engorgement of the portal circulation, which engorgement is a marked factor in the production of many bowel inflamations.

As to the patients who take these treatments while on their backs, I will say, that the majority of my patients, nearly all of them, in fact, are treated in my office. If they are on their backs, they remain so but a few days, because I cure them.

XLIV.—SMALLPOX.

BY JOHN M. BATTEN, M. D.,
DOWINGSTOWN, PA.

In the endemic or epidemic of smallpox in Pittsburg, Pa., in 1871, we had an opportunity of observing it in all its phases. In certain families there was an immunity from the disease, while in other families there was an extreme predisposition to it. There seems to be a heredity of immunity in some families from all diseases, while in other families there seems to be a predisposition to all diseases, and smallpox is no exception to this rule. In making observation of those immune from smallpox, I found that they had been made immune by heredity; by having had smallpox or varioloid; by vaccination of themselves or either one or both of their parents. This immunity in some was perfect, while in others only partial. The latter was attacked with varioloid. The most cases of confluent smallpox that came under my observation occurred among those who had not themsedves had smallpox, nor had they been vaccinated, or either one or both of their parents. While a perfect vaccination or an attack of smallpox or varioloid is commonly a protection against all the varieties of smallpox, yet not in all cases, as a Mrs. W., a married woman, mother of several children, suffered under my observation with confluent smallpox in 1871, although she had had a previous attack of confluent smallpox. It is my opinion that a perfect vaccination in youth is usually a protection to the individual thus vaccinated from smallpox in all its varieties during the remainder of his life.

Variola is derived from the Latin varus, a blotch, a pimple, while pox is of Saxon origin meaning a pouch; the prefix small was added in the 15th century. The first appearance of smallpox took place A. D. 569, about the date of Mohammed's birth; it seemed then to have commenced in Arabia, and raising the siege of Mecca by an Abyssinian army is attributed to the ravages made by smallpox among the troops. The new part which Arabia under Mohammed and his followers was made to play in history contributed to the rapid

spread of smallpox throughout the world. Rhazes, an Arabian physician who practiced at Bagdad about the beginning of the tenth century, is the first medical author of whom we read whose writings have come down to us who treats expressly of the disease; it is known, however, that he quotes several of his predecessors, one of whom flourished in the year Hegire 622. Measles and scarlet fever were first confounded with smallpox, but Sydenham was the first to point out the essential differences between the diseases. Boerhaave was the first to proclaim that smallpox was propagated by contagion.

The stage of incubation is the period that elapses from the time the contagion is taken into the system till it manifests itself in the initiatory fever, and this time is about 14 days, although the period may be longer or shorter. During this time he commonly remains in his accustomed health.

The first symptoms of the disease are usually chills and fever accompanied with pains in the back, particularly in the loins. There is also nausea and vomiting. If there is severe pain in the back accompanied with high fever we may expect a severe form of the disease. Convulsions often usher in the disease in children. About the third or fourth day, more generally the fourth day, the rash makes its appearance, first on the face, then on the neck and wrists, then on the trunk, and finally on the extremities. On the fifth day, the eruption is usually complete. It first consists of minute papules, or pimples; these papules are converted into vesicles filled with thin lymph about the fourth day of the eruption, having a depression in their center, when they are termed umbilicated. These vesicles now become surrounded with an areola which becomes a dark crimson color. The lymph is finally converted into pus which distends their walls until they become hemispherical. A dark spot makes its appearance about the eighth day of the eruption at the center of the pustule and is soon converted into a dry scab. When the scab falls it leaves either an indelicate cicatrix or a purplish mark, which fades away very slowly, and exposed to a cool atmosphere for a long time is rendered very distinct. In disappearing, the scales

take the same order as the appearance of the eruption. First the scabs fall off the face, then those of the neck and wrists, then those of the trunk, then, lastly, those of the extremities. When the pustules are far apart and few in number, the disease is known as discrete smallpox, but when they are so numerous as to touch one another or run together, the disease is known as confluent smallpox; between these two grades of smallpox is an intermediate grade or variety named semi-confluent, or coherent is often spoken of. In the discrete form the fever subsides on the appearance of the eruption and if the pustules are few the fever does not reappear, but in the confluent form, the maturation of the pustules is attended with more or less fever. The throat is sore and red, with some pustules scattered on the fauces, roof of the mouth and inside of the cheeks, when the eruption makes its appearance on the surface; at the same time the patient may be affected with salivation. The cellular tissue is also involved in conflux smallpox, the swelling is great and the patient is unable to open his eyes. The eruption on the face coalesces and makes one huge sore. The itching is intolerable and the fever is of a typhoid kind. The patient is delirious, restless and sleepless, while the pulse is small, feeble and frequent. In the confluent form the inflammation of the mouth, nasal passages, larynx and pharynx adds much to the distress of the patient. This condition sometimes produces suffocation. The odor of the confluent form in the maturation stage is very offensive.

In an endemic or epidemic of smallpox when the disease is well established in a community the diagnosis of the disease is not difficult, as all cases of sickness beginning with fever and backache accompanied with nausea and vomiting are likely to terminate in smallpox. It is only in the first cases of an endemic or epidemic, in isolated or sporadic cases, when the disease resembles measles or chickenpox, that the diagnosis might be more difficult.

To make a correct diagnosis of smallpox in all its varieties at the first inception of the disease in a location or community is very important, as thereby the spread of the disease by

proper means and methods may be checked and an endemic or epidemic of it prevented. Besides a correct diagnosis of smallpox at the first inception of the disease tends to establish confidence in the physician who thus correctly diagnoses the disease and it may save him from being compelled to defend himself in suit of mal-practice.

Variola may be distinguished from measles by the following differential symptoms: In variola, as we have seen, the eruption first comes out on the face, then on the neck and wrists, then on the trunk and lastly on the extremities. In measles the eruption first comes out on the face and trunk. In measles there is a catarrh of the mucous membrane of the air passages and of the eyes. In variola the fever abates on the appearance of the eruption, to be resumed at a greater or less degree at the maturation of the pustular stage, whereas in rubeola the fever continues throughout the eruptive stage. The papules even in the confluent forms are remarkably discrete and exhibit not the slightest tendency to grouping, while the miaculo-papules of rubeola are developed simultaneously on the face and trunk, while those of smallpox commonly appear first on the face, then on the neck and wrists, then on the trunk and lastly on the extremities; the older and larger, therefore, in the site the earliest appearance. The eruption of measles is made to disappear or pale on pressure beneath the fingers, while there is greater persistence of color in the variolous papules. In measles in passing the flat of the hand over the surface of the body the pimples are less distinctly felt than in passing hand in the same way over the surface of case of smallpox. Even with all the differential symptoms in mind it may be very difficult to make a satisfactory diagnosis between smallpox and measles, but by waiting twenty-four hours the difficulty may be cleared up.

The different symptoms of variola and scarlet fever are so plain that we could not confound one disease with the other. The rash of scarlet fever is so entirely different from that of smallpox and it makes its appearance on the second day of the fever, while the eruption of smallpox comes out on the fourth day and the fever of scarlet fever continues

throughout the eruptive period. The distinguishing features of scarlet fever are the strawberry tongue, the anginous condition of the throat, the boiled lobster color of the skin and fine appearance of the rash.

The pustular stage of smallpox may be confounded with the pustular stage of syphilis, but a history of the disease, the chancre, the six weeks to three months incubation and the chronic form of the disease would go far in differentiating syphilis.

J. C. Sullivan, Cairo, Ill., emphasized the point that when the patient complains of persistent backache followed by fever and pustular eruption affecting the palms of the hands and soles of the feet protruding from beneath the outer skin, we have a case of smallpox to deal with, no matter how mild or insignificant it may appear, and confluent or hemorrhagic smallpox may be contraced from it.

Variola and varioloid may be distinguished from varicella by the fact there is existing in the locality in which the suspected case of varicella may appear an endemic or epidemic of smallpox; by a greater rise of fever in febrile stage; by the typical papular stage of the eruption at the onset; by the typical pustular stage before the desiccation takes place; by the confluent lesions in confluent cases, and by the marked stadium of the disease. Varicella is usually a disease of children and is of mild character, the fever, papules, and pustules are not as marked as in variola and varioloid, though in the latter it may be extremely difficult, if not impossible, to make a differential diagnosis between varioloid and varicella. The sooner it is known, not only by the profession, but by the laity, that intermediate forms do occur that cannot be distinguished one from the other, the better it will be for both. Scattered papulo-vesicular and vesico-pustular lesions after high fever, and continuing to mature for over forty-eight hours, must always be viewed with suspicion. Superficial visicles on the third day of the disease or commingled with very minute and superficial pustules should be looked upon as characteristic of varicella.

In an editorial on the "Early Recognition of Smallpox," in the A. M. A. Journal, vol xxxix No. 2, page 83, the editor speaks of the great importance and value of an early diagnosis of smallpox so that by proper means and methods the spread of smallpox could be prevented. He quotes an article on the diagnosis of eruptive fevers by Professor Courmont, of Lyons, who claims that a diagnosis of smallpox can be made even at a distance by an examination of a single drop of blood from the suspected case.

The prognosis of variola-vera is very fatal, as at least fifteen to fifty per centum die of the disease. It is most fatal among pregnant women, newborn babes, the aged and those with their systems saturated with alcohol. The hemorrhagic and pupuric symptoms are highly portentous and indicate a fatal result.

I believe that a perfect vaccination is usually a perfect immunity from the disease during the remainder of the life of the vaccinated. In 1871 I used the humanized vaccine and inserted the vaccine into the arm in three different places. Some times one, two or three of these places took perfectly, with very little ulceration and were without any bad results as far as my observation extended. These vaccinations were often made in a family of children, where there was existing at the time a case of smallpox in the house; in this way I often caused an immunity of these children thus exposed. It is my opinion that the humanized vaccine—barring the danger of spreading disease—is the best and most protective.

Dr. Robert N. Nelson, Philadelphia, Pa., says: It seems that glycerinated virus as well as the vicious influence of the shield was disposed to present a more extensive ulcerative surface and a greater tendency to sloughing than the dried virus or the arm to arm method. But he says the latter method is out of the question on account of the rapid spread of syphilis among the masses, and if it eventually proves true that glycerinated virus opens up a broader avenue to the tetanic germ into the system than the less cleanly and safer dried point, we will have to beat a retreat till we discover

a substitute for glycerine that does not carry with it its disadvantages.*

The very greatest care should be taken to prevent sepsis or diseased germs from entering the vaccine in the preparation of it. Then we could have a pure vaccine to begin with and the operation of vaccination could be performed aseptically as well as antiseptically. Then would there be very little danger of having anything but a healthy and perfect vaccination. To test the perfection of the vaccination the individual thus vaccinated may have the operation performed repeatedly in short periods in the same aseptic and antiseptic manner, or until it is found that the individual is immune.

Hauenstein argues that humanized vaccine is preferable to bovine vaccine and says the claim of some practitioners against the latter is absurd and hints that the epidemic of smallpox all over the world at this time is due to the adoption of bovine vaccine. He thinks the humanized vaccine will gain in favor.

The treatment of smallpox is largely expectant. Ointments and baths highly tinctured with mercury are used with seeming benefit. Fensen's phototherapy has been highly satisfactory in the maturation stage. The great object in the treatment of smallpox is cleanliness, fresh air, proper nourishment and make the patient as comfortable as possible.

Dr. E. W. Ridings, in a paper before the Tennessee State Medical Society, says he believes he has lessened the mortality of smallpox very considerably by subjecting them to bichloride of mercury baths.

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*Vol. xxxviii No. 19, A. M. A. Journal.

XLV.—GASTROJEJUNOSTOMY WITH THE McGRAW ELASTIC LIGATURE, FOR THE RELIEF OF GASTROPTOSIS.

BY H. O. WALKER, M. D., DETROIT, MICH.

If, as Meinert asserts, 90 per cent. of all women have gastroptosis, and knowing as we do the inefficiency of mechanical and medicinal treatment of this distressing malady in a great number of cases, one may be pardoned for presenting a method that offers features of benefit, whether it is mechanical, medicinal or surgical.

Surgically, little has been done, and that but recently, in the way of improvement of this condition. Gastroplication and gastrorrhaphy are the principal procedures, and have not been attended with very brilliant results, as they do not always relieve the chronic pyloric kinking, and although I may not be presenting anything new, yet, as far as I know, except by allusion, nothing has been presented along the lines that I offer. With this brief introduction I beg leave to make a somewhat detailed report of three cases in which a gastrojejunostomy was done for the relief of a chronic invalidism due to gastroptosis.

CASE I.—Miss A., aged 24, music teacher, was sent to me by Dr. Henry, Northville, Mich., and admitted to Harper Hospital Oct. 21, 1901, with a previous history of having had a fall when 7 years of age, causing a left inguinal hernia. For the last ten years she has had a variety of abdominal disturbances referable to the pelvic region, accompanied with disturbances of the stomach, such as distress after eating, with eructations of large quantities of gas, occasional vomiting and chronic constipation. Within the last three years she has had attacks of pain in the right iliac region, and about three months ago had an attack that was quite severe, confining her to bed for about a week, accompanied with vomiting and elevation of temperature. This point has been quite sensitive ever since. She has had a cronic leucorrheal discharge for several years, also hemorrhoids, and a sensitive left ovary. In fact, she has been in a state of chronic invalidism for years.

Examination.—A reducible left inguinal hernia was quite in evidence. A sensitive appendiceal area, a retroverted uterus, with chronic endometritis, internal hemorrhoids and a pro-

lapsed, sensitive, cystic ovary were found. These conditions in themselves were sufficient to produce stomach trouble, so that as careful examination as should have been made of the stomach conditions was not done.

First Operation.—Oct. 22, 1901, after due preparation, I first did a curettement; then a herniotomy, following with a median section, removing the cystic ovary and the appendix, which showed evidences of chronic infection, and, lastly, the removal of the hemorrhoids. The temperature never exceeded 100, and after three days it dropped to normal, and she made a good recovery from these operations.

Subsequent History.—Her stomach trouble, however, did not improve, and a more careful examination was made, which, with the symptomatology, showed irregular attacks of distention, gastralgia, eructations, nausea and vomiting, with the persistent, typical constipation of gastroptosis. Palpation and percussion gave a succussion or swashing sound of a large quantity of fluid in the stomach, and its lower border could be mapped out below the umbilicus. At times considerable pain was referable to the gall-bladder area. There had, however, never been any jaundice; right nephroptosis was slight; stomach analysis, after a test breakfast, showed total acidity of .35 per cent., mostly lactic acid, with free HCl .12775 per cent.: undigested starch granules and a large amount of mucus.

Second Operation.—After explaining to her the advisability of another operation, she consented, and after due preparation I operated Nov. 29, 1901, opening the abdomen from just below the ensiform tip down to about five inches. No evidences of gall-bladder adhesions, constriction or thickening of the pylorus were apparent. The lower border of the stomach extended about two inches below the umbilicus, so that the pancreas was observable above the lesser curvature of the stomach as she lay on the table. On drawing out the stomach the transverse colon was down below that point, as well as a general enteroptosis.

My experience in gastroplication and gastrorrhaphy, in the few cases on which I have operated, has been far from satisfactory, and I conceived the idea that a direct opening from the stomach into the intestine would be better than an attempt to relieve the pyloric kinking by lessening the size of the stomach, or fixing it high up to the abdominal wall inside. I therefore concluded to do a gastrojejunostomy by using the McGraw elastic ligature, in which the various steps of the

method are shown in the illustrations that I herewith present.

Fig. 1 shows the approximation of the serosa by continuous silk suture. Fig. 2 shows the elastic ligature introduced. Fig. 3 shows one tie of the elastic ligature, with strong silk ligature underneath, ready to fasten the elastic ligature when it is drawn taut. As a matter of safety, before cutting off the ligatures, it is well to make another tie of each ligature. Fig. 4 shows the ligature tied; while Fig. 5 shows the operation complete with a continuous suture of the serosa entirely covering the knot. It is my custom in introducing the needle to take up full two and a half inches in the bite of both the stomach and intestines, thereby giving a large anastomotic opening.

This method was followed with this patient. I fed her mostly by the rectum for five days with beef and saline enemata every four hours, with occasional sips of water by the mouth. From this time on she was gradually fed by the mouth, taking solid food on the eleventh day. Her recovery was complete from the operation, and she left the hospital on the twenty-third day thereafter. I have seen and heard from her several times since, and she informs me that she rarely knows that she has a stomach.

CASE 2.—Miss M. P., aged 28, gives a family history of her father dying at the age of 48 from an accident; mother died at 33 after a long history of ill health. Her brothers and sisters, seven in number, are in good health. She has done housework ever since she was 14. At 6 she fell into a well, sustaining severe injuries, from which she apparently made a good recovery. At 15 she had facial paralysis; malarial fever twice, at the ages of 17 and 19, and a broken ankle at 20. In 1893 she had had her first attack of appendicitis, which was followed by recurrent attacks, when, in March, 1897, she was operated on during a severe attack, and the appendix removed, followed by recovery from the operation. Since 1890 she has had attacks of what she called indigestion or dyspepsia, with gas eructations, and pain referable to the liver and stomach, with more or less bloating. Her menstrual periods have been more or less painful. In 1898 she had what her physicians called nervous prostration, followed by acute articular rheumatism.

Examination.—In February, 1901, she consulted me for the first time since I had operated on her for appendicitis for

pain over the region of the stomach and gall bladder, which had become unbearable, whether she had eaten moderately or not. She wondered whether an operation might be of benefit to her, and she expressed her willingness to undergo one if she could get relief. At this time her weight was much below normal. She had an anxious expression and was somewhat jaundiced. This jaundiced appearance had been noticed at intervals for some time. She had become habitually constipated; her tongue was coated, and there was constant eructation of gas. Inspection showed general tympany of abdomen. while palpation evinced pain referable to the stomach, but more particularly to the gall bladder. Percussion revealed a succussion sound over the region of the stomach, extending nearly to the umbilicus. While it was apparent that she had gastroptosis, yet the preponderance of opinion was in favor of a gall-bladder lesion, in all probability calculi, with adhesions from previous attacks of cholecystitis.

First Operation.—Feb. 7, 1901, I operated on her, making a median incision, and the only lesion, aside from gastroptosis, that could be observed was a band extending from the gall bladder to the pyloric end of the stomach. This was relieved. The stomach could be readily brought out through the abdominal opening, and the lower border of the stomach extended below the umbilicus. Gastrectasia was not well marked, neither was there any thickening or apparent constriction of the pyloric orifice. Gastroplication did not seem to be indicated in this case, so I attempted fixation of the lower curvature of the stomach with several interrupted sutures to the abdominal parietes on a line about two inches below the ensiform cartilage.

Subsequent History.—There were no untoward symptoms following the operation, and she seemed better for a while, but soon her condition became gradually worse, and continued so for more than a year, when she came to me again. I sent her to the Harper Hospital, with a view to attempting further surgical effort for her relief. At this time her pulse was 100, temperature 99, respirations normal, except for a slight bronchial irritation; appetite poor; bowels acting every day, with an occasional diarrhea; pain, especially when lying down, with nausea. She is very nervous.

On April 11, 1902, she was given a test breakfast, which was withdrawn one hour later; amount, 180 c.c.; reaction acid; undigested food from the previous meal; some mucus; total acidity, 0.225 per cent.; free HCl none. Lactic acid present.

Second Operation.—April 12 an incision was made in the same line as before. The previous fixation was satisfactory, except that it failed to accomplish the object for which it was intended, for the upper part of the stomach had rolled down and behind, making matters worse than before. I found (a statement which I neglected to make at the previous operation) a ptosis both of the liver and right kidney, together with general enteroptosis, which, however, was not marked. I first peeled off the attachments that I had previously made, so as to cause a perfect freeing of the stomach, then did an anterior gastrojejunostomy with the McGraw elastic ligature after the manner indicated in the report of Case 1.

Subsequent History.—The first three weeks of convalescence were satisfactory, as she did not complain of any of the old symptoms, but in the fourth week she began vomiting, which was preceded by pain in the back and right side, with an obstinate constipation. Vomiting became frequent and distressing. The symptoms pointed to partial intestinal obstruction or possibly a vicious circle, yet she did not vomit bile, but what seemed to be merely stomach contents from what she had eaten and drunk. The obstruction appeared rather to the left and above the point of anastomosis, or I could map out here an irregular intestinal outline.

Third Operation.—May 30, 1902, her abdomen was again opened, and extensive adhesions liberated. The intestine had assumed a horseshoe shape, and had become adherent on itself. The adhesions were freely relieved, and after satisfactory hemostasis, I powdered the whole surface with aristol, as recommended by Morris, with a view of preventing their recurrence.

Subsequent History.—There was no vomiting for two weeks, when the situation became as before, with a return of the obstinate constipation, calling for vigorous catharsis and copious enemata. The abdominal distention and pain were unbearable, necessitating hypodermics of morphin.

Fourth Operation.—Having observed the reports by my friend, Morris, and others, of the value of the Cargile membrane in preventing adhesions, I made another effort, July 26, to relieve her by using nearly a whole package containing twelve sheets of the membrane.

Subsequent History.—The adhesions were more marked than at the last operation, and after two weeks of comparative comfort, the symptoms returned, with greater severity than before. Feeling through my efforts to relieve

my patient that I had probably made her worse than she would have been, I felt that she demanded at my hands a further effort.

Fifth Operation.—So, on August 29, 1902, I did what probably should have been done before, namely, made an enterostomy, using the McGraw ligature for the purpose. The point of anastomosis was made between the intestine, about eight inches below the gastrojejunostomy. It goes without saying that the adhesions were more extensive than at any previous time. The Cargile membrane had not been absorbed, but was firmly embedded in the cicatricial adhesions. I then, again, made a liberal peeling of all adhesions, and after causing hemostasis as much as possible, I filled the abdominal cavity to distention with normal salt solution, closing the abdominal wound with interrupted silkworm-gut sutures.

The Cure.—September 1, the vomiting had entirely ceased, and has not recurred. She eats anything and everything without any discomfort; she has daily natural evacuations of the bowels; in fact, she did not have an untoward symptom, and on October 7, 1902, she called to see me at my office, presenting a perfect picture of health, to bid me good-bye, as she was about to leave for her home in Ontario.

CASE 3.—Mrs. K., aged 42, was brought to me by Dr. C. F. McDonald, of Goodrich, Mich, with a history as follows, which he kindly furnished:

She was married twice, at the ages of 15 and 30, respectively, and was never pregnant. Her condition of health previous to four years ago was fairly good, except at irregular intervals. For eight years preceding 1898 she had distress in the region of the gall bladder and over the stomach. In 1898 these symptoms increased, pain radiating from the ensiform cartilage in front to the right of the scapula behind and through the thorax. The pain was very severe and accompanied by chilly sensations, nausea, eventuating in vomiting, which was followed by immediate relief for a time. The vomitus consisted mostly of mucus, and of whatever food was in the stomach, with bile at times. During these attacks there was never any elevation of temperature or undue circulatory disturbance. With these so-called attacks of indigestion there would be sometimes slight icterus and mental depression. One of these attacks lasted six weeks, followed with marked loss of flesh and strength. Following this severe attack she was fairly comfortable for

nearly two years, although rarely a week passed without a reminder by uneasy stomachic sensations. About a year ago she had an attack that was more severe and prolonged than that of 1898. The interval symptoms continued until six weks ago, when she had another severe attack. Medication and change of climate availed nothing. Dr. McDonald recommended an operation, with the expectation of finding gall-bladder trouble. Certainly the history pointed in that direction, yet with past experience I could easily make out gastroptosis, with characteristic swashing sound on palpation. In this instance no examination of the stomach contents was made, owing to a misunderstanding of instructions for preparations.

Operation.—The history of a gall-bladder lesion was so plain that I could not question its existence, yet on opening the abdomen there was no evidence whatever that it had ever been affected. The sagging of the stomach was very marked, for on withdrawing it and placing it on hot towels on the abdominal wall it easily extended to three inches below the umbilicus. The pyloric orifice was slightly lessened in size and thickened, due entirely to its long-continued kinking caused by the dragging of the stomach. There was ptosis of the liver, right kidney, colon and intestines generally. April 23, 1902, at the Harper Hospital, I did a gastrojejunostomy with the McGraw elastic ligature, in the manner heretofore described. This woman made a rather phenomenal recovery, in that she left the hospital on the fourteenth day after the operation. Dr. McDonald states that since her return home she has had none of the old symptoms; she has increased in weight, and appears perfectly well.

It must be apparent, except possibly in Case 2, where the band of adhesions was found, that the gall-bladder symptoms in all of these cases can only be ascribed to the dragging weight of the fluid-distended stomach.

In making gastrojejunostomy I resort to the anterior method, selecting a point in the intestine for attachment to the stomach fully twenty-four inches from the pyloric orifice, there being less possibility at this distance of causing a vicious circle. The symptoms of obstruction that occurred in Case 2 were entirely due to adhesions of the intestine to the anterior abdominal wall, and not

a true vicious circle; yet as a means of prevention of this possible contingency it would be well to do an anastomotic enterectomy six or eight inches below the gastrojejunostomy. This was done in my last case, which I operated on three or four days before I left home, and the outcome of the operation I have not yet learned.

Of all the methods that have been suggested for the performance of lateral intestinal anastomosis, with most of which I have had a liberal experience, none, to my mind, possesses the advantages of the McGraw elastic ligature.

1. Its simplicity, which is far greater than any other method yet presented.
2. Ease and rapidity with which it can be done.
3. Less liability to sepsis than by any other method.
4. No danger of a foreign body.
5. A larger opening can be made without liability to cicatricial contraction.

In Case 2, where I had the opportunity of opening the abdomen three times after the gastrojejunostomy, I found the opening very large, with no tendency whatever to contraction. Although my experience with gastrojejunostomy for the relief of the distressing symptoms of gastroptosis is limited, yet the results thus far obtained are certainly encouraging enough to warrant further effort in this direction.

OBITUARIES.

ABEL MIX PHELPS, M. D.

Dr. Abel Mix Phelps was born at Alburg Springs, Vermont, on January 27, 1851. He was descended from an English family which settled in Connecticut in 1630. He belonged to the family of Phelps, in which there have been so many distinguished men, among others the Hon. Edward J. Phelps, late Minister to England, and the Hon. William Walter Phelps, late Minister to Germany. Dr. Phelps was graduated from the University of Michigan in 1873. He immediately entered into active practice as a surgeon, having been appointed Surgeon to the Vermont Central Railroad and to large iron companies, and as a young man he had a large experience in serious accident cases. After a highly successful career of seven years, he went to Germany, studying surgery for four years under Schede, Esmarch, Von Volkman, Billroth and Thiersch. He at this time was thoroughly interested in orthopedic surgery and introduced the American methods in the Allegemeines Krankenhaus at Hamburg. Dr. Phelps for a long time held the position of Professor of Surgery in the University of Vermont, and of Orthopedic Surgery in the University of New York, and since 1887 he had been Professor of Orthopedic Surgery in the Post-Graduate Medical School and Hospital. He founded the Home for Crippled Children at Englewood, New Jersey, known as "Daisy Fields." In 1894 he was President of the Orthopedic Society, and in 1900 of the Medical Society of the State of New York. He was a member of the Medical Society of the County of New York, and of the Academy of Medicine. His career as a surgeon was of the most brilliant character. After the last Medical Congress in Paris, he was invited to deliver lectures and operate at various of the clinics in German Universities. These invitations he accepted and

made himself widely known on the Continent by his achievements. Dr. Phelps died at the Post-Graduate Hospital on October 6th, 1902, from abdominal troubles, from which he had been suffering for some time.

BARTON W. STONE, M. D.

Dr. Barton W. Stone, of Louisville, Ky., died in Louisville, Ky., November 13, 1901, of pneumonia, complicating rheumatism, after a comparatively short illness.

Dr. Stone was unmarried and was born in Fulton, Mo., in 1844. He was graduated, second in his class, when nineteen years of age, at Westminster College, Fulton, and shortly afterward came to Louisville and studied medicine under Dr. J. M. Holloway, graduating at the Kentucky School of Medicine in 1867. He at once entered upon the active practice of his profession in Louisville.

Dr. Stone was appointed assistant physician in the Western Asylum, Hopkinsville, in 1869. He remained in that position until 1889, when he was appointed superintendent by Gov. Simon Bolivar Buckner, and was reappointed by Gov. Jno. Young Brown.

He resigned in 1896 and went abroad for the purpose of studying asylum methods in Europe with a view to opening a private institution for the treatment of nervous diseases. He established a sanitarium in the fall of 1896, when he associated himself with Dr. T. S. Crockett in the Morningside Sanitarium near Nashville. He moved to Louisville in 1899 when he opened the Beechhurst Sanitarium, great success attending the venture.

Dr. Stone was one of the best known alienists in the United States.

L. B. TUCKERMAN, M. D.

Dr. L. B. Tuckerman, of Cleveland, died March 5, 1902, after an illness of six weeks from intestinal complications, aged 54 years. He was a graduate of the Long Island College Hospital of 1877.

ANDREW B. CHAPIN, M. D.

Andrew B. Chapin, M. D., Mount Clemens, Mich. Died March 9, 1902, of paralysis, aged 64 years.

Dr. Chapin graduated from the University of Michigan in 1861; was a surgeon during the Civil war; once a member of the faculty of the Detroit College of Medicine, and was mayor of Mt. Clemens for two years.

J. T. JELKS, M. D.

Dr. J. T. Jelks, Hot Springs, Ark., was born in Russell County, Ala., May 20, 1849. He served in the Confederate army during the last years of the Civil war. He was graduated in medicine from the University of Nashville in 1870, practicing first in Georgia, and then in St. Louis. He settled in Hot Springs in 1877, where he remained until his death.

In 1883 he was appointed to a Professorship of Genito-Urinary Surgery and Venereal Diseases in the College of Physicians and Surgeons of Chicago, which he retained until 1890. In 1892 he was appointed to the chair of Gynecology and Syphilology in Barnes Medical College, St. Louis, holding this until the time of his death. He was a member of numerous medical societies and was a frequent contributor.

His death, June 24, 1902, was a sad blow to a large clientele and a wide circle of friends in and out of the profession.

MINUTES OF THE TWENTY-EIGHTH ANNUAL MEETING OF THE MISSISSIPPI VALLEY MEDICAL ASSOCIATION.

Held in the Auditorium of the Midland Hotel, Kansas City, Mo.

October 15, 16, 17, 1902.

FIRST DAY—MORNING SESSION.

The meeting was called to order by Dr. A. H. Cordier, Chairman of the Committee on Arrangements, at 11 a. m.

Dr. Cordier introduced the Rev. Dr. Edwin M. Mouzon, who delivered the invocation.

Congressman W. S. Cowherd delivered the address of welcome on behalf of the citizens of Kansas City.

Dr. C. Lester Hall delivered the response to the address of welcome on behalf of the local physicians.

Dr. Geo. F. Butler, of Alma, Mich., delivered the response to the address of welcome on behalf of the visiting physicians and their wives.

Dr. Cordier then introduced the President, Dr. S. P. Collings, of Hot Springs, Ark., who took charge of the meeting.

The Secretary read his report, as follows:

Mr. President and Members of the Mississippi Valley Medical Association:

It is a great pleasure to bid you welcome to the twenty-eighth annual meeting of this prosperous organization.

We offer you a program replete with the best to be had, essayists and orators of renown, and a variety of subjects grouped in a manner which we trust will be pleasing to all. We would call attention to the importance of the special symposiums, tuberculosis, the Roentgen ray and typhoid fever. We trust much of value will emanate from this gathering for the good of the people.

The Association's past year has not been as prosperous financially as previous ones. Though your Secretary has labored hard he has been unable to collect sufficient dues from delinquent members to issue the volume of Transactions for the Put-in-Bay meeting. The Publication Committee was

loth to borrow money for this purpose and in this decision was upheld by a majority vote of the Executive Committee.

The following is a list of members dead during the past year: Dr. E. W. Woodruff, Columbus, O.; Dr. L. B. Tuckerman, Cleveland, O.; Dr. H. M. Skillman, Lexington, Ky.; Dr. J. T. Jelks. Hot Springs, Ark.; Dr. Stell Davis, Waelder, Tex.; Dr. Andrew B. Chapin, Mt. Clemens, Mich.; Barton W. Stone, Louisville, Ky.

We trust your meeting may be a thoroughly enjoyable and profitable one. Respectfully submitted,

HENRY ENOS TULEY,
Secretary.

The report of the Committee on Publication was included in the Secretary's report, as was also that of the Committee on Necrology.

The Treasurer's report was deferred to a later hour.

The President appointed the following Committee on Credentials: Drs. Punton, Dannaker and Freyman.

The Vice President, Dr. J. C. Culbertson, occupied the chair and the President delivered his annual address.

SECOND DAY—MORNING SESSION.

The meeting was called to order at 9 a. m. by the President.

The Executive Committee reported that the Secretary's accounts were found correct.

The Nominating Committee was appointed as follows:

Michigan—H. O. Walker, Detroit, Chairman.
Arkansas—T. E. Holland, Hot Springs.
Colorado—A. M. Holmes, Denver.
Illinois—Frank P. Norbury, Jacksonville.
Indiana—D. C. Peyton, Jeffersonville.
Iowa—B. F. Gillmor, Creston.
Kansas—C. M. Mutz, Douglass.
Kentucky—T. H. Stucky, Louisville.
Massachusetts—J. B. Learned, Northampton.
Missouri—Bransford Lewis, St. Louis.
Mississippi—C. C. Bass, Columbia.
North Carolina—Paul Paquin, Asheville.
Tennessee—F. D. Smythe, Memphis.

Ohio—C. S. Chamberlin, Cincinnati.

Oklahoma—J. W. Bowling, Alva.

Pennsylvania—W. F. Barclay, Pittsburg.

Texas—M. M. Edmonson, San Antonio.

New York—Thos. H. Manley, New York.

Dr. H. O. Walker offered the following resolution:

Whereas, Abel Mix Phelps, a noted surgeon of New York and a distinguished member of this Association, died October 6, 1902, and

Whereas, Many of us present at our last meeting remember his kindly greetings and his able disquisition on Joint Surgery.

Resolved, That we recognize in the death of Dr. Phelps a great loss to the country, our profession and this Association and that in respect to his memory we transcribe upon our minutes these resolutions, and that we send to his bereaved family a copy of the same.

On motion the resolution was unanimously adopted by a rising vote.

The Committee on Credentials reported favorably on the following candidates for membership:

J. E. MacNeill.....Denver, Colo.
Spence Redman.....Platte City, Mo.
T. D. Miller.....Excelsior Springs, Mo.
T. A. Hopkins.....St. Louis, Mo.
C. M. Mutz.....Douglass, Kas.
J. S. Mott.....Kansas City, Mo.
P. S. Fulkerson.....Lexington, Mo.
Jabez N. Jackson.....Kansas City, Mo.
Milton M. Edmonson.....San Antonio, Tex.
Eugene King.....Kansas City, Mo.
H. O. Leonard.....Kansas City, Mo.
Silvio von Ruck.....Asheville, N. C.
W. W. Johnston.....Denver, Colo.
G. Howard Thompson.....St. Louis, Mo.
Joseph W. Sherer.....Kansas City, Mo.
E. J. Goodwin.....St. Louis, Mo.
R. J. Christie, Jr.....Quincy, Ill.
Emerson M. Sutton.....Peoria, Ill.
N. P. Wood.....Independence, Mo.
F. M. McCallum.....Kansas City, Mo.
W. A. Campbell.....Colorado Springs, Colo.
John J. Gaines.....Excelsior Springs, Mo.
C. C. Bass.....Columbia, Miss.

Christian A. Dannaker.....Kansas City, Mo.
Eugene Smith.....Detroit, Mich.
J. M. Allen.....Liberty, Mo.
Silas W. Wossoman.....Cunningham, Kas.
C. M. Fulton.....Kansas City, Mo.
J. D. Griffith.....Kansas City, Mo.
R. McE. Schauffler.....Kansas City, Mo.
S. B. Langworthy.....Leavenworth, Kas.
J. E. Sawtelle.....Kansas City, Mo.
P. D. Hughes.....Kansas City, Kas.
B. L. Sulzbacher.....Kansas City, Mo.
S. Welch.....Laddonia, Mo.
Louis W. Luscher.....Kansas City, Mo.
Jos. Rilus Eastman.....Indianapolis, Ind.
F. Gregory Connell.....Leadville, Colo.
B. F. Gillmor.....Creston, Ia.
John C. Hickerson.....Independence, Mo.
Wm. T. Thompson.....Kansas City, Mo.
William B. Fletcher.....Indianapolis, Ind.
Frank E. Coulter.....Omaha, Neb.
D. C. Peyton.....Jeffersonville, Ind.
A. A. Fréyman.....Kansas City, Mo.
Chas. B. Hardin.....Kansas City, Mo.
Robert L. St. Clair.....Blue Springs, Mo.
Clement E. Grigsby.....Lansing, Kas.
Marcus A. Bogie.....Kansas City, Mo.
Frank D. Smythe.....Memphis, Tenn.
Bransford Lewis.....St. Louis, Mo.
J. A. Bowling.....Alva, Okla.
William M. Reed.....Kansas City, Mo.
W. J. Frick.....Kansas City, Mo.
Ernest G. Mark.....Kansas City, Mo.
John W. Kyger.....Kansas City, Mo.

On motion the Secretary was instructed to cast the unanimous ballot of the Association for the election of the candidates, which he did, and they were declared duly elected.

The Treasurer made his report as follows:

Mississippi Valley Medical Association, Kansas City, Mo.

Gentlemen: I have the honor of submitting the following report:

RECEIPTS.

Dues acc't	$985.27	
Transaction acc't	1.50	
Stationery acc't (refunded)	19.00	
Exhibit acc't	114.50	
		$1,120.27

DISBURSEMENTS.

Transaction acc't	$135.00	
Expense acc't	30.00	
Stationery acc't	242.98	
Salary acc't	368.00	
Treasurer's acc't	300.00	
		$1,075.98
Balance		$ 44.29
		308.00
		$ 352.29

Respectfully submitted,
THOS. HUNT STUCKY, Treas.

Approved: EDWIN WALKER.
A. H. CORDIER.

The Address in Medicine was delivered by Dr. Hugh T. Patrick, of Chicago, Ill.

THIRD DAY—MORNING SESSION.

The meeting was called to order by the President at 9:30 a. m.

The Committee on Credentials reported the following names for membership, having passed favorably on their applications:

Col. N. A. Drake	Kansas City, Mo.
Robt. H. Babcock	Chicago, Ill.
John G. Lapp	Kansas City, Mo.
John H. Henson	Mound Valley, Kas.
Ellery M. Hetherington	Kansas City, Mo.
Geo. B. Norberg	Kansas City, Mo.
Arthur E. Hertzler	Kansas City, Mo.
C. A. Ritter	Kansas City, Mo.
H. D. McQuade	Kansas City, Mo.
Herbert C. Anderson	Kansas City, Mo.
F. Wesley Sells	Osceola, Ia.
A. M. Holmes	Denver, Colo.
Herman E. Pearse	Kansas City, Mo.
Harry L. Heller	Kansas City, Mo.
U. G. Hoshaw	Chanute, Kas.
Thos. F. Lockwood	Butler, Mo.
H. C. Jarvis	Schell City, Mo.
W. J. Bell	St. Joseph, Mo.
Jos. S. Gardner	Kansas City, Mo.
George W. Nesbitt	Sycamore, Ill.

M. P. Sexton.....Kansas City, Mo.
Sam Ayres.....Kansas City, Mo.
J. C. Rogers.....Kansas City, Mo.
Horace B. McCall.....Kansas City, Mo.
Chas. E. Barnett.....Ft. Wayne, Ind.
Howard Hill.....Kansas City, Mo.
Jno. W. Kepner.....Kansas City, Mo.
Joseph W. McKee.....Kansas City, Mo.
Alexander Haggart.....Ottawa, Kas.
Harrison W. Wright.....Ottawa, Kas.
Emma B. Standley.....Alexis, Ill.
Henry G. Graham.....Chicago, Ill.
H. M. Beaver.....Spring Hill, Kas.
F. S. Clinton.....Tulsa, Ind. Ter.
John W. Crabtree.....Butler, Mo.
Edgar C. Rankin.....McLouth, Kas.
T. C. Boulware.....Butler, Mo.
J. D. Dunham.....Pattonsburg, Mo.
Caleb Winfrey.....Kansas City, Mo.
James Moores Ball.....St. Louis, Mo.
W. L. Brosius.....Gallatin, Mo.
Chas. D. Ruth.....Keokuk, Ia.
J. H. Johnson.....Kansas City, Mo.
L. G. Taylor.....Kansas City, Mo.
L. G. Bowers.....Richmond, Ind.
W. H. Winningham.....Edinburg, Mo.
J. L. Burns.....Jonesboro, Ark.
L. D. Greene.....Richmond, Mo.
Paul Hendrickson.....St. Joseph, Mo.
Maurice Kahn.....Leadville, Colo.
Benj. F. Fortuer.....Vinita, Ind. Ter.
E. Lowray.....Excelsior Springs, Mo.
Oliver C. Sheley.....Independence, Mo.
Calvin L. Cooper.....Kansas City, Mo.
Geo. F. Hamel.....Kansas City, Mo.
C. Herring.....Highland Station, Kas.
William E. Lower.....Cleveland, O.

On motion the Secretary was instructed to cast the unanimous vote of the Association for the election of these candidates, which he did, and they were declared duly elected.

The following resolution was read:

Whereas, It is the sense of the Executive Committee that steps be taken toward affiliation with the American Medical Association as a District Branch in accordance with recommendations of its Committee on Reorganization, and

Whereas, By the provisions of the Constitution and By-

Laws of the Mississippi Valley Medical Association it is necessary that amendments thereto be held over for one year before action is taken upon them; therefore, be it

Resolved, That the Constitution of the Mississippi Valley Medical Association be so amended as to conform to the Constitution suggested by the American Medical Association for subordinate affiliated Societies and that the reading of this resolution be equivalent to the requirements of the Constitution of the Mississippi Valley Medical Association regarding Constitution revision.

On motion the resolution was unanimously adopted.

The Nominating Committee reported as follows:

For President, Dr. Edwin Walker, of Evansville.

For First Vice President, Dr. Hugh T. Patrick, of Chicago.

For Second Vice President, Dr. Wm. Britt Burns, of Memphis.

For Secretary, Dr. Henry Enos Tuley, of Louisville.

For Treasurer, Dr. Thos. H. Stucky, of Louisville.

Place of meeting for 1903, Memphis, Tenn.

Chairman Committee of Arrangements, Dr. John L. Jelks, Memphis.

On motion the report of he Nominating Committee was received and adopted.

The Address in Surgery was delivered by Dr. Geo. W. Crile, of Cleveland, O.

On motion a vote of thanks was tendered Dr. Crile for his Address in Surgery and the essay referred to the Committee on Publication.

The following resolution was unanimously adopted:

Resolved, That the Executive Committee and members of the Mississippi Valley Medical Association tender their thanks to Mr. Dean and the management of the Midland Hotel for their generous treatment and many courtesies extended during this evening.

The following resolution was unanimously adopted:

Resolved, That the thanks of this Association be tendered Dr. Cordier for his efficient and successful management of this meeting, and also to the profession and citizens of Kansas City for their entertainment and many courtesies.

A handsome Morris chair was placed on the platform at this juncture and Dr. Cordier requested to occupy it. Mr. Harrington, representng W. D. Allison & Co., said:

Dr. Cordier, in behalf of the exhibitors and attendants, I want to thank you for the many courtesies extended us and to present you with this chair.

Dr. Cordier, responding, said:

I am completely taken off my feet—I don't know but what you began taking me off my feet last night. I appreciate this gift very much indeed. I appreciate it for many reasons. I appreciate it because it comes from a class of men who are the doctors' friends in every sense of the word. I appreciate it because it comes from men who are not only the doctors' friends, but who are a lot of good, whole-souled, jolly fellows, well met on any occasion, whether in the office or elsewhere. I doubly appreciate it because I didn't expect anything of the kind. I didn't know that I had done anything to merit any gift or anything of that kind from any of you gentlemen. I appreciate it from that standpoint. If I have made you gentlemen feel at home here I have done nothing more than my duty, for you have come a long distance and stood by us and tried to make things interesting for us and I am sure you deserve all the things it is possible for us to point in your direction. I trust you will never regret having made this little gift—little, not in a sense of a depreciative feeling by any means. I trust that as I grow old, which I undoubtedly will some time, and am bowed down with the cares of a well spent and useful life, many past memories and reflections will be renewed in this chair.

The President, Dr. Collings, in retiring from the Chair, said:

Before turning over the gavel to my successor I want to thank the members for the courtesy each and every one has extended to me during my term of office, and especially to the Chairman of the Committee of Arrangements and our efficient Secretary.

Dr. Collings then appointed Drs. Burns and Barclay to

escort the newly elected President, Dr. Edwin Walker, to the chair.

Dr. Collings said: Dr. Walker needs no introduction to you. In turning over this gavel to him I do so with a great deal of pleasure, for I know he will wield it with justice and impartiality.

Dr. Walker, responding, said:

I want to thank you for the honor you have conferred upon me. It is an honor to represent as fine a body as the Mississippi Valley Medical Association. I feel also the responsibility. Kansas City has had a successful meeting and the meetings up to this time have been successful. If we are to keep up with them I hope you will all assist me for the next meeting.

There are two points I will mention here. One is that the Mississippi Valley Medical Association was created for the entire profession. Its object was to bring together all branches of the profession, the specialist and the general practitioner, and that object has been carried out, but it seems to me that if in the coming meeting we could have one especially for the general practitioner it would be appreciated by the profession at large. By this I do not mean that the specialists should not take part. On the contrary, they have always taken an important part in the program, but if the subjects could be so arranged that the articles by the specialists are such as to assist the general practitioner it would add to the interest. Articles of an extremely special character should be discussed in a body of specialists, while in this body all departments should be brought together, and it shall be my endeavor to carry out that idea as far as possible.

Another important matter is the question of permanent membership. For the first few years this Association was rather a loose organization, but since we have been publishing our own transactions it seems to me it should be considered an honor to be a permanent member and we should have a permanent fund for the carrying out of the objects of the Association.

One other point should be thought of at this time. Many

of the papers presented here have been by non-members. While it is all right to have certain papers read by invited guests, still the bulk should be by members of the Association and the courtesy should be extended to only a few. We shall endeavor in the next meeting to more thoroughly unify the Society.

On motion the session then adjourned to meet again in Memphis in 1903.

MINUTES OF THE SURGICAL SECTION OF THE MISSISSIPPI VALLEY MEDICAL ASSOCIATION.

FIRST DAY—AFTERNOON SESSION.

The meeting was called to order by the President at 2 p. m.

Dr. Emerson M. Sutton, of Peoria, Ill., read a paper entitled "Cancer of the Rectum."

Dr. Emil Ries, of Chicago, Ill., read a paper entitled "Treatment of Extensive Rectal Strictures."

Both these papers were discussed by Dr. John L. Jelks, of Memphis, and Dr. Sutton in closing.

Dr. Bransford Lewis, of St. Louis, Mo., read a paper entitled "The Value of Ureteral Catheterization in the Male and Female."

Discussed by Dr. Jos. R. Eastman, of Indianapolis, Dr. E. G. Mark, Kansas City, and Dr. Lewis in closing.

Dr. B. F. Gillmor, of Creston, Ia., read a paper entitled "The Mechanics of Intubation."

Discussed by Dr. Wm. L. Kenney, of St. Joseph, Mo.

On motion the paper entitled "The Value of Antiseptic Paraffine in the Cure of Cancers, and Its Uses in Surgical Operations," by Dr. Herman G. Crosby, of St. Louis, was read by title and referred to the Committee on Publication.

On motion the paper entitled "Diagnostic Points of Difference Between Spermatorrhoea and Seminal Pollutions," by Dr. F. R. Sturgis, of New York, was read by title and referred to the Committee on Publication.

Dr. Jos. Rilus Eastman, of Indianapolis, Ind., read a paper entitled "Laminectomy for Fracture-Dislocation of the Fourth and Fifth Cervical Vertebra."

Discussed by Drs. Wellington T. Stewart, of Chicago, Carl E. Black, of Jacksonville, Ill., and Thos. H. Manley, of New York City.

Drs. Carl E. Black and Frank Parsons Norbury, of Jacksonville, Ill., read a paper in conjunction, entitled "Spinal Injuries."

Dr. Thomas H. Manley, of New York City, read a paper entitled "Extrinsic Traumatisms of the Spine; Their Diagnosis, Pathology and Treatment."

Both papers were discussed by Drs. Wellington T. Stewart, of Chicago, Hugh T. Patrick, of Chicago, and by Drs. Manley and Black in closing.

On motion adjourned to 8 p. m.

FIRST DAY—EVENING SESSION.

The meeting was called to order by the President at 8 p. m.

Dr. Edwin Walker of Evansville, Ind., read a paper entitled "Some Experiences with the X-ray as a Therapeutic Agent."

Dr. C. M. Mutz, of Douglass, Kan., read a paper entitled "The Physiological Action and Therapeutic Uses of the X-ray."

Dr. J. Rudis-Jicinsky, of Cedar Rapids, Ia., read a paper entitled "The Relation of the So-called X-ray Burn to the Treatment of Malignant Growths."

Dr. Everett J. Brown, of Decatur, Ill., read a paper entitled "The X-ray Treatment of Cancer; With Report of Cases Cured."

These papers were discussed by Drs. Sutton, of Peoria, Ill., Eastman, of Indianapolis, Ind., Scott, of Kansas City, Mo., and Drs. Walker, Rudis-Jicinsky and Brown, in closing.

Dr. Truman W. Brophy, of Chicago, presented a patient on whom he had operated for cleft palate and demonstrated the facility with which the patient was able to pronounce words and converse.

"The Surgical Treatment of Trigeminal Neuralgia," by Dr. Truman W. Brophy, of Chicago, was illustrated by stereoptican views.

On motion adjourned to 9 a. m.

SECOND DAY—MORNING SESSION.

Dr. Chas. E. Barnett, of Ft. Wayne, Ind., read a paper entitled "Renal Calculi or Gall Stones; Differential Diagnosis; Report of a Case."

Discussed by Drs. Smythe, of Memphis, Lewis, of St. Louis, Ries, of Chicago, and Dr. Barnett, in closing.

Dr. H. O. Walker, of Detroit, Mich., read a paper entitled "Gastro-Enterostomy for the Relief of Gastroptosis."

Discussed by Drs. Crile, of Cleveland, Eastman of Indianapolis, and Dr. Walker, in closing.

Dr. F. Gregory Connell, of Leadville, Colo., read a paper entitled "Through and Through Intestinal Suture; with Report of Additional Cases."

Discussed by Drs. Manley, of New York, Ries, of Chicago, Wyman, of Detroit, Ruth, of Keokuk, and Dr. Connell, in closing.

Dr. Herman E. Pearse, of Kansas City, Mo., read a paper entitled "Cysts of the Mesentery; with Report of a Case and Specimen."

On motion adjourned to 2 p. m.

SECOND DAY—AFTERNOON SESSION.

The meeting was called to order by the President at 2 p. m.

Dr. John Young Brown, of St. Louis, Mo., read a paper entitled "Abdominal Section Following Vaginal Puncture."

Discussed by Drs. Hayden, of Evansville, Hall, of Kansas City, Cordier, of Kansas City, and Dr. Brown, in closing.

Dr. Emory Lanphear, of St. Louis, Mo., read a paper entitled "Cancer of the Uterus in the Mississippi Valley."

Discussed by Drs. Ruth, of Keokuk, Ries, of Chicago, Hayden, of Evansville, and Dr. Lanphear, in closing.

Dr. Maurice Kahn, of Leadville, Colo., read a paper entitled "A Plea for the Abandonment of the Abdominal Belt after Celiotomy."

Discussed by Drs. Ries, of Chicago, Lanphear, of St. Louis.

Dr. C. E. Ruth, of Keokuk, Ia., read a paper entitled "Antistreptococcic Serum in Septic Conditions."

Discussed by Drs. Hall, of Kansas City, Boulware, of Butler, Crile, of Cleveland, and Ruth, in closing.

At this point Dr. Geo. W. Crile, of Cleveland, read a paper describing the operation performed by him for the extraction of a set of false teeth from the stomach of a man who was supposed to have swallowed the teeth.

Discussed by Drs. Lanphear, of St. Louis, and by Dr. Crile, in closing.

Dr. L. G. Bowers, of Richmond, Ind., read a paper entitled "The Early Diagnosis and Conservative Treatment of Fibro-Myomatous Tumors of the Uterus."

Discussed by Dr. Frick, of Kansas City, and Dr. Bowers in closing.

On motion adjourned to 9:30 a. m.

THIRD DAY—MORNING SESSION.

Dr. David C. Peyton, of Jeffersonville, Ind., read a paper entitled "Treatment of Fractures of the Patella."

Discussed by Drs. Walker of Evansville, Eastman of Indianapolis, Smythe of Memphis, Barnett of Ft. Wayne, Pearse of Kansas City, Herring of Highland Station, Kan., and Dr. Peyton, in closing.

THIRD DAY—AFTERNOON SESSION.

The meeting was called to order at 2:30 p. m. by the President, Dr. Walker.

The Surgical Section having completed its program, the Medical Section was taken up.

MINUTES OF THE MEDICAL SECTION OF THE MISSISSIPPI VALLEY MEDICAL ASSOCIATION.

FIRST DAY—MORNING SESSION, OCT. 15TH, 1902.

Dr. Paul Paquin, of Asheville, N. C., in the chair.

The Section was called to order at 10 o'clock.

Dr. John M. Batten, of Downingstown, Pa., read a paper on "Smallpox."

Dr. E. M. Houghton, of Detroit, Mich., read a paper entitled "An Attempt to Obtain Uniformly Active, Sterile and Non-Irritating Preparation of Digitalis for Subcutaneous and Internal Administration."

Dr. J. J. Gaines, of Excelsior Springs, Mo., read a paper entitled "Some Developments in the Therapy of Iodoform," which was discussed by Drs. Barclay, Stewart, Richardson, and the discussion closed by the essayist.

Adjourned.

FIRST DAY—AFTERNOON SESSION.

Dr. J. B. Learned, of Northampton, Mass., presented a paper on "Normal Sleep Versus Drug Unconsciousness," which was discussed by Drs. Crothers, Allen, Patrick and the discussion closed by the author of the paper.

Dr. H. M. Beaver, of Spring, Hill, Kan., read a paper on "The treatment of Exophthalmic Goitre by Electricity."

Discussed by Drs. Norbury, E. J. Brown, Chas. B. Brown, Sterne, Stewart, and the discussion closed by the essayist.

Dr. James Billingslea, of Baltimore, Md., contributed a paper on "Typhoid Fever; Its Germicidal Treatment; with a Report of 156 Cases."

Discussed by Drs. Barclay, Batten, Taylor, Crothers, Stewart, Howard, Burns, Sterne, E. J. Brown, Learned, Beaver, Taylor and Campbell.

Adjourned.

FIRST DAY—EVENING SESSION.

Papers in the symposium on tuberculosis were read as follows:

1.—"What Class of Pulmonary Cases Do Well in Colorado?" by Dr. W. A. Campbell, of Colorado Springs, Colo.

2.—"Climatic and Electric Peculiarities of Colorado Favoring Recovery in Pulmonary and Intestinal Diseases, and From Surgical Operations," by Dr. J. E. MacNeill, of Denver, Colo.

3.—"Digestion and Indigestion in Pulmonary Tuberculo-

sis, with Notes on Mixed Infections," by Dr. Paul Paquin, of Asheville, N. C.

4.—"The Excellent Results in the Treatment of Diseases, Especially Tuberculosis, by the Use of the Ultra-Violet Ray," by Dr. Albert E. Sterne, of Indianapolis, Ind.

5.—"Sanitarium Treatment of Pulmonary Tuberculosis, and How it May be Carried Out at Home," by Dr. Robert H. Babcock, of Chicago, Ill.

6.—"Tent Life in the Treatment of Tuberculosis," by Dr. A. Mansfield Holmes, of Denver, Colo.

The discussion on this symposium was opened by Dr. Minor, and continued by Drs. Taylor, von Ruck, Stewart, Campbell, and the discussion closed by the various essayists.

Adjourned.

SECOND DAY—MORNING SESSION, OCT. 16TH, 1902.

Dr. George F. Butler, of Alma, Mich., read a paper on "Neurasthenia," which was discussed by Drs. Sterne, Learned, Norbury, Punton, and the discussion closed by the author of the paper.

Dr. John Punton, of Kansas City, Mo., followed with a paper entitled "The Criminal Responsibility of the Epileptic," which was discussed by Drs. Fletcher and Beaver.

Dr. F. E. Coulter, of Omaha, Neb., read a paper on "The Sudden Atrophic Influence of Cranio-Spinal Nerves, with Report of a Case."

Adjourned.

SECOND DAY—AFTERNOON SESSION.

Dr. W. B. Fletcher, of Indianapolis, Ind., read a paper on "The Insanities of Childhood," which was discussed by Dr. Sterne, and, in closing, by the essayist.

Dr. James Moores Ball, of St. Louis, Mo., read a paper on "Sympathetic Eye Diseases," which was discussed by Drs. Pryor, Smith and the discussion closed by the essayist.

Dr. J. W. Sherer, of Kansas City, Mo., followed with a paper on "Toxic Amblyopia; Clinical Report and Pathology," which was discussed by Drs. Ball and Patrick.

Dr. Flavel B. Tiffany, of Kansas City, Mo., read a paper

on "Bilateral Glaucoma," which was discussed by Drs. Ball, Sherer, and the discussion closed by the essayist.

Adjourned.

THIRD DAY—MORNING SESSION, OCT. 17TH, 1902.

Dr. T. D. Crothers, of Hartford, Conn., read a paper on "Diseases Preceding and Following the Use of Alcohol and Opium."

Discussed by Dr. Punton, and, in closing, by the essayist.

Dr. C. C. Bass, of Columbia, Miss., read a paper on "The Treatment of Typhoid Fever with Castor Oil."

Discussed by Drs. Herring, Burns, Stucky, Crothers, Punton, and the discussion closed by the essayist.

Dr. Henry G. Graham, of Chicago, Ill., read a paper entitled "Culture of Infusoria, with Presentation of Specimens."

Adjourned.

THIRD DAY—AFTERNOON SESSION.

Dr. Wm. T. English, of Pittsburg, Pa., read a paper on "Croupous Pneumonia; Points in Diagnosis and Treatment."

Dr. Wm. F. Barclay, of Pittsburg, Pa., followed with a paper on "Pneumonia."

These papers were discussed jointly by Drs. Babcock, English and Barclay.

Dr. John L. Jelks, of Memphis, Tenn., read a paper entitled "Three Months' Experience in the Treatment of Chronic Dysentery."

Discussed by Drs. Barclay, Thompson, von Ruck, Smythe, and the discussion closed by the essayist.

Adjourned.

ROSTER OF MEMBERS

OF THE

Mississippi Valley Medical Association.

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A. P. BUCHMAN,
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H. B. BUCK,
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WM. BRITT BURNS,
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C. B. BURR,
Flint, Mich.
JAS. A. BURROUGHS,
Asheville, N. C.
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